HORIZON NUCLEAR POWER

WYLFA NEWYDD

ENERGY WORKING FOR BRITAIN

Wylfa Newydd Project

6.3.21 ES Volume C - Road traffic-related effects (project-wide) App C2-4 - DCO TA Appendix G - Strategic Traffic Model - Overview

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Wylfa Newydd Project

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1. About this Report

1.1 Purpose and Applicability

This report sets out the approach followed to produce a Traffic Model designed to analyse the potential impacts of the various construction and operational phases, together with the Associated Development and Off-Site Power Station Facilities and decommissioning of the Power Station Development.

The Strategic Traffic Model, designed to facilitate the assessment of the various elements of the Power Station Development referred to above, has been developed for this purpose. The model is a complex tool that draws on a range of input data and facilitates a number of processes and calculations to produce a wide range of outputs. These outputs are used for a range of disciplines to assess the effect of the Wylfa Newydd Project at a number of locations across Anglesey and the Welsh mainland.

Due to the complexity and scale of the model, the range of inputs, processes and outputs that are fundamental to its operation are summarised in this report and highlighted below. The following can be considered the following main topics:

- data collection;
- Strategic Traffic Model functionality and processes;
- construction phase;
- operational phase;
- model extents;
- modelled periods;
- modelled scenarios;
- input data; and
- model outputs.

It should be noted that this report represents a Method Statement, detailing how the model has been developed to best suit the bespoke nature of the Wylfa Newydd Project. It therefore does not represent a typical transport modelling report due to the various non-standard features that it has been necessary to capture in the model. However, this report will detail the various nuances that have been included to develop a modelling tool that is fit for purpose and allows the traffic impacts of the Wylfa Newydd Project to be comprehensively considered.

This report is based upon the most up-to-date information available regarding the likely components required for the Wylfa Newydd Project and also the relevant policy and guidance documents. The key assumptions relating to the model inputs have been summarised in the Strategic Traffic Model Assumptions Report (WN016-JAC-OS-REP-00100), which is appended to this report. It should be noted that this report represents the work related to the traffic model at this current stage of the Wylfa Newydd Project design along with the assumptions that have been used to determine model inputs. At this time, the traffic model is not expected to require additional updates and this report will reflect the information available to Jacobs at the time of issue. However, the model can be updated if required to reflect changes in the Wylfa Newydd Project, the publication of new guidance or the outcome of consultation discussions with the relevant stakeholders.

1.2 Technical Glossary and Definitions

Table 1.1 presents a list of technical terms and abbreviations used in this assessment.

Table 1.1: Technical glossary and abbreviations

Full Title	Abbreviation	Description
Alternative Emergency Control Centre	AECC	A facility that is physically separate from but local to (and forms part of) the Wylfa Newydd Power station. This would provide back-up command and communications facilities that would be used to manage an incident at the Power Station Site in the extremely unlikely event that the primary facilities on the Power Station Site were not available.
Annual Average Daily Traffic	AADT	Total volume of vehicle traffic (over a 24-hour period) on a road flowing past a certain point over a year, divided by 365 days.
Annual Average Weekday Traffic	AAWT	Total volume of vehicle traffic (over an 18-hour period) on a road flowing past a certain point over a year, divided by 253 days.
Associated Development	AD	Meaning works included in the DCO which facilitate the delivery of the Nationally Significant Infrastructure Project, and which principally includes: the Site Campus; a temporary Park and Ride facility at Dalar Hir for construction workers; a temporary Logistics Centre at Parc Cybi; A5025 Off-line Highway Improvements; and an electrical connection to the National Grid substation.
Automatic Traffic Count	ATC	Equipment placed on a road that counts traffic.
Cumulative effect	-	An environmental effect caused by the interactions of the effects on the environment from different aspects of the same project and from other projects.
Daily Construction Commuting Zone	DCCZ	An area based on a 90-minute commute time from the Wylfa Newydd Development Area.
Design Year	-	The worst year in the first 15 years (post completion of a development project) for changes in traffic flows.
Embedded mitigation	-	Measures to avoid or reduce environmental impact that can reasonably be incorporated into the design of the scheme that is submitted to the relevant local authority as part of the planning application for the Proposals.
Emergency Control Centre	ECC	The primary facility, on the Power Station Site, that provides the primary location for managing the site response to an incident.
Environmental Impact Assessment	EIA	The process through which the likely significant effects of a development on the environment are identified and assessed.

Full Title	Abbreviation	Description
Environmental Survey Laboratory	ESL	A facility that is physically separate from but local to the Power Station and forms part of the Power Station. The ESL would perform a normal operating function for environmental monitoring and, as such, would contain facilities such as monitoring equipment to conduct radiological surveys in the local area.
Existing Power Station	-	The existing Magnox nuclear power station at Wylfa Head.
Full Traffic Model	-	A detailed Strategic Traffic Model used to generate traffic flows associated with the Wylfa Newydd Project as well as surveyed traffic and committed developments. The Strategic Traffic Model represents a tool that provides appropriate levels of detail and scope to support a full suite of assessments included as part of the Wylfa Newydd Project.
Gravity Model	-	A separate tool used to determine the proportion of workers likely to reside in various accommodation types within the Daily Construction Commuting Zone, using a range of data such as population and bed availability by accommodation type. Forms a tool that has been used to derive many of the traffic distributions applied in the Strategic Traffic Model.
Growth factor	-	A term used to describe how future traffic flows are estimated from existing flows, using national and local factors that take into account future changes such as car ownership and demographics, e.g. employment, population and housing.
Heavy Goods Vehicle	HGV	A goods vehicle with a gross weight of more than 3.5 tonnes.
Integrated Traffic and Transport strategy	ITTS	The strategy to be developed by Horizon to present a holistic approach for the delivery of sustainable transport and access solutions to and between the key development sites that together form the Wylfa Newydd Project, including to ensure efficiency, manage environmental impacts, ensure safety and present transport solutions.
Isle of Anglesey County Council	IACC	The local authority governing the area within which the Wylfa Newydd Project is intended to be constructed.
Land use	-	What land is used for, based on broad categories of functional land cover, such as urban and industrial uses and the different types of agriculture and forestry.
Light Goods Vehicle	LGV	All goods vehicles with a gross weight of not more than 3.5 tonnes.
Logistics Centre	-	The Logistics Centre will be a temporary secure facility from where deliveries to the Power Station Site are managed to reduce traffic on and impacts to the local road network. The dispatch of lorries would be controlled to relieve traffic to the Wylfa Newydd Development Area. Robust logistics management will ensure that we can avoid convoys of delivery vehicles travelling along the A5025 and reduce queueing of vehicles entering the Power Station Site.

Full Title	Abbreviation	Description
Main Construction	-	Construction activities within the Wylfa Newydd Development Area that would result in the completion of the Wylfa Newydd Power Station, including final levelling and deep excavations for the foundations, civil construction activities, commissioning of both Units and site finishing.
Manual Classified Turning Count	MCTC	A type of traffic survey whereby all turning manoeuvres at a junction are counted (e.g. left, right, straight ahead), together with the type of vehicle.
Marine Off-Loading Facility	MOLF	A facility comprising three purpose built quays: one mainly for the delivery of large construction components including AILs, and two mainly for bulk materials such as aggregates and cement.
Medium Goods Vehicle	MGV	Goods vehicles of between 3.5 and 7.5 tonnes.
Mobile Emergency Equipment Garage	MEEG	An Off-Site facility for the managed storage of vehicles and equipment for responding to any incidents that might arise during the operational phase of the Power Station.
National Policy Statement for Nuclear Power Generation EN-6	NPS EN-6	The National Policy Statement designated by the Secretary of State in July 2011 which sets out national policy on new Nuclear Power Stations identified as potentially suitable for deployment by 2025.
Off-line Highway Improvements	-	Highway improvements that involve the construction of new sections of road.
Off-Site Power Station Facilities	-	Comprising the Alternative Emergency Control Centre (AECC), Environmental Survey Laboratory (ESL) and a Mobile Emergency Equipment Garage (MEEG).
On-line Highway Improvements	-	Highways improvements that are made to the existing road, generally within the existing highway corridor.
Other Goods Vehicles 1	OGV1	(as MGV) Goods vehicles of between 3.5 and 7.5 tonnes.
Other Goods Vehicles 2	OGV2	(as HGV) All goods vehicles over 7.5 tonnes.
Park and Ride	-	The park and ride is temporary facility where workers can park their vehicles securely and transfer to our shuttle buses, which will take them to the Power Station Site. The site is designated to include a zone for buses to collect and drop off passengers, with a management office and parking for staff (working at the Park and Ride).
Partial Traffic Model	-	A superseded version of the Strategic Traffic Model providing appropriate level of detail and scope to support relevant documents at the time of use.
Power Station	-	The proposed new nuclear power station, including two UK Advanced Boiling Water Reactors to be supplied by Hitachi-GE Nuclear Energy Ltd., supporting facilities, buildings, plant and structures, and radioactive waste and spent fuel storage buildings.

Full Title	Abbreviation	Description
Pre-Application Consultation Stage Two	PAC2	PAC2 is part of the planning consent process for NSIPs, and is essential to obtaining consultation feedback prior to the application for the DCO.
Public Service Vehicle	PSV	Buses, ambulances, fire engines etc.
Reasonably Foreseeable Future Project	RFFP	Projects that can reasonably be expected to progress, and whose effects would overlap spatially and/or temporally with those of the lead project. Projects meeting these criteria have the potential to act together with the lead project to cause on or more cumulative effects.
Scheduled Outage	-	The shutdown of a generating unit, transmission line or other facility for inspection, maintenance or refuelling, which is scheduled well in advance.
Site Campus	-	The Site Campus is a temporary facility that would house up to 4,000 construction workers in modular type accommodation blocks, providing an independent living space for each worker, with shared campus-style amenities.
Study Area	-	The spatial area within which environmental effects are assessed (i.e. extending a distance from the development footprint in which significant environmental effects are anticipated to occur. This may vary between topic areas.
Visitor and Media Centre	-	A facility serving the dual purpose of: a visitor centre used to educate visitors through a permanent interactive exhibition and a hosting venue for educational activities and special events; and a media reception centre to facilitate press briefings in the event that activities or an incident at the Power Station attracted substantial media attention.
Wylfa Newydd Development Area	-	The indicative areas of land and sea including the areas surrounding the Power Station Site that would be used for the construction and operation of the Wylfa Newydd Power Station. This area is representative of the maximum area that would be physically affected by main construction activities and used to form the landscaped settling of the operational Wylfa Newydd Power Station.
WNDA Development	-	The indicative areas of land and sea within which the majority of the permanent Wylfa Newydd Power Station buildings, plant and structures would be situated. It would include the two nuclear reactors, steam turbines, the cooling water system intake and pump house, outfall structures, breakwaters and the Marine Off-Loading Facility, as well as other ancillary structures.

1.3 Responsible Parties

The responsible parties in this Project are identified in Table 1.2 below, together with a brief summary of their roles and responsibilities.

Table 1.2: Responsible parties

Responsible Party	Description
Horizon Nuclear Power Limited (Horizon)	Horizon is a UK energy company developing two new nuclear power stations in the UK; it is a wholly owned subsidiary of Hitachi-GE Nuclear Energy Limited. Horizon is responsible for supplying certain elements of the input data required.
Hitachi-GE Nuclear Energy Limited	Hitachi-GE Nuclear Energy Limited is the reactor provider who would lead the design, equipment provision and build of the main plant. Hitachi-GE Nuclear Energy Limited would provide (via Horizon) technical input data required.
Isle of Anglesey County Council (IACC)	The local authority governing the area within which it is intended to construct the Power Station. The IACC has a number of functions, including the granting of planning permission as Local Planning Authority for the Associated Development.
Welsh Government	The devolved government for Wales. The Welsh Government is responsible for A55 and Britannia Bridge, as well, as other highway functions as defined in Wales Act 2017.
Jacobs UK Limited (Jacobs)	Consultants appointed by Horizon to undertake EIA and support the Environmental Permit applications for the Wylfa Newydd Project and Associated Development.

2. Wylfa Newydd Project Introduction

2.1 Wylfa Newydd Project Description

The *National Policy Statement for Nuclear Power Generation (EN-6)* (Department of Energy and Climate Change, 2011a) identifies the proposed site at Wylfa Head and seven other sites, with each site potentially suitable for the deployment of a new Nuclear Power Station by the end of 2025.

Horizon is proposing to construct and operate the Wylfa Newydd Project, which comprises the following:

2.1.1 The Nationally Significant Infrastructure Project

- Power Station; the proposed new Nuclear Power Station, including two UK Advanced Boiling Water Reactors to be supplied by Hitachi-GE Nuclear Energy Ltd., supporting facilities, buildings, plant and structures, and radioactive waste and spent fuel storage buildings;
- Other on-site development: including landscape works and planting, drainage, surface water management systems, public access works including temporary and permanent closures and diversions of public rights of way, new power station access road and internal site roads, car parking, construction compounds and temporary parking areas, laydown areas, working areas and temporary works and structures, temporary construction viewing area, diversion of utilities, perimeter and construction fencing;
- Marine works: comprising a Cooling Water System intake and outfall, Marine Off-Loading Facility (MOLF) and breakwater structures; and
- Off-site Power Station Facilities: comprising the Alternative Emergency Control Centre (AECC), Environmental Survey Laboratory (ESL) and a Mobile Emergency Equipment Garage (MEEG).

2.1.2 Associated Development

- On-site campus providing temporary workers' accommodation (Site Campus);
- A temporary Park and Ride facility at Dalar Hir for construction workers (Park and Ride);
- A temporary Logistics Centre at Parc Cybi (Logistics Centre);
- A5025 Off-line Highway Improvements; and
- An electrical connection to the National Grid substation.

2.1.3 Wylfa Newydd Project

There are a number of elements of the Wylfa Newydd Project which represent embedded mitigation measures; the aim of which is to reduce the traffic impact of the development and to minimise subsequent environmental effects. These measures form part of the App C2-4 - DCO TA Appendix F - Integrated Traffic and Transport Strategy (Application Reference Number: 6.3.20), which aims to minimise the traffic generation and resultant vehicular impacts of construction activity associated with the Wylfa Newydd Project. App C2-4 Appendix F (Application Reference Number: 6.3.20) has five stated objectives, namely:

- enhanced highway capacity and safety;
- integration with public transport services;
- improved transport links to the Wylfa Newydd Power Station;
- encouraging sustainable travel; and
- reduced need to travel.

In response to these five key objectives, the following key mitigation measures form the embedded mitigation associated with App C2-4 Appendix F (Application Reference Number: 6.3.20) for the Wylfa Newydd Project include the following:

- MOLF – this would provide for a large volume of goods and materials to be delivered to the site by sea, thereby reducing the number of HGVs required to transport material by road.
- A5025 On-line and Off-line Highway Improvements – these would provide new bypasses and highway improvements to specific areas of the current network to improve the current road infrastructure, and reduce the impact of increased traffic volumes on the main existing settlements located on the A5025.
- Logistics Centre – a proposed Off-Site facility that would be used to store materials and manage and control deliveries to the WNDA development.
- Park and Ride – a proposed Off-Site facility located close to the A55 that would be used to ensure construction a large proportion of workers do not travel directly to the WNDA development by private car. Workers would be transported by bus thereby reducing the total number of vehicles travelling to the site on the A5025.
- North and East Bus Strategy – this strategy would reduce the total number of vehicles travelling to the WNDA development by providing a bus service to and from the WNDA development from areas in the north and east of Anglesey, for those workers for whom use of the Park and Ride would be impractical due to its location.
- The Site Campus – a proposed purpose built temporary facility that would accommodate up to 4,000 construction workers in modular type accommodation blocks. This would be located within the Wylfa Newydd Development Area and therefore reduce the overall number of workers being required to travel from elsewhere, reducing the overall traffic impact of the Wylfa Newydd Project.

These are the embedded mitigation elements associated with App C2-4 Appendix F (Application Reference Number: 6.3.20), which have been fully incorporated into the assumptions and Traffic Model input data. It is noted that there are other proposed methods of further mitigating traffic impacts as part of the Wylfa Newydd Project in addition to the specific North and East Bus Strategy. These include the following:

- Assumed car share factors that have been applied to car trips associated with the Project; and
- Direct-to-site bus strategy, which focusses on trips from Holyhead and Mainland zone 1.

Further information relating to mix of vehicle types and car share factors associated with App C2-4 Appendix F (Application Reference Number: 6.3.20) are provided in the Strategic Traffic Model Assumptions Report. The impacts of the measures listed above have been fully captured in the Traffic Model and any anticipated reduction in traffic volumes reflected in the traffic flow outputs. Further information relating to the inclusion of, and the assumptions associated with the embedded mitigation measures and App C2-4 Appendix F (Application Reference Number: 6.3.20) in the Traffic Model, are provided in the Assumptions Report.

There are four main stages in the lifetime of the Power Station:

- stage one: Enabling Works (including Site Preparation and Clearance traffic);
- stage two: Construction;
- stage three: Operation; and
- stage four: Decommissioning.

Whilst this document focuses on the development, structure and process associated with the Traffic Model, a detailed Strategic Traffic Model Assumptions Report has also been provided which is appended to this report should be read in parallel to this Method Statement. This documents the key model data

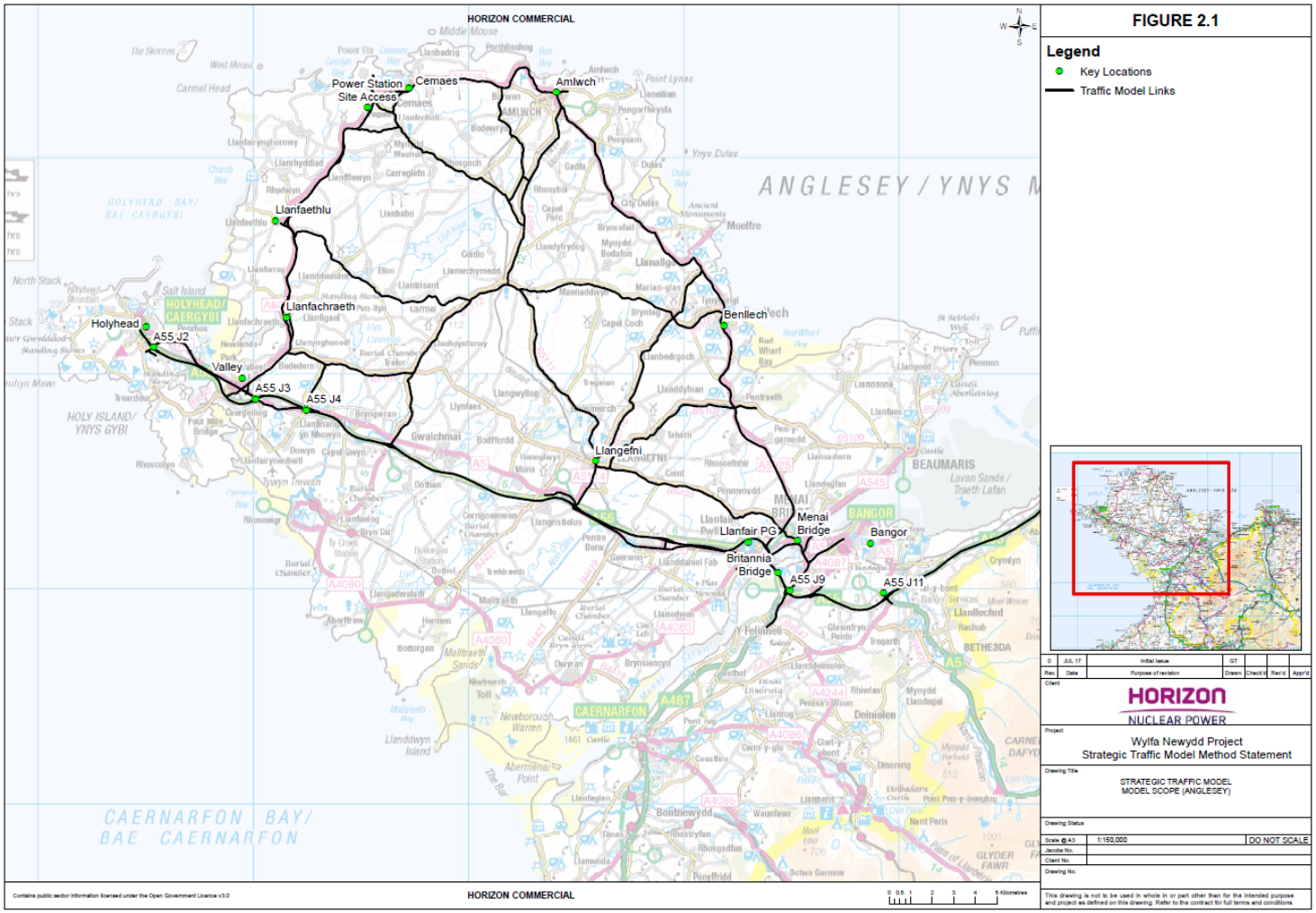
inputs, including any assumptions employed to derive model data inputs and the implementation of these within the model itself.

2.2 Study Area

The study area considered is defined as comprising the following key sections of the road network on Anglesey and on the mainland, shown in Figure 2.1.

- A5025 west from A5 (Valley) to Cemaes.
- A5025 east from Cemaes to Menai Bridge.
- Mainland feeder roads including:
  - A487 at A55 Junction 9; and
  - A4087 at A55 Junction 10;
- Partial coverage of the A5 between Holyhead and A55 Junction 11:
  - Holyhead to east of Dalar Hir;
  - Rhostrehwfa to Bangor; and
  - A55 Junction 11.
- A55 from Junction 1 at Holyhead to Junction 11 (on the mainland).
- B roads accessing the A5025:
  - B5109;
  - B5110;
  - B5112; and
  - B5420.
- Minor roads accessing the A5025.

Figure 2.1: Traffic model study area



2.3 Traffic Model Scope

This report provides information relating to the timeline for developing the Strategic Traffic Model. It includes a range of information including detail on model development, key updates undertaken and data collection to provide a suitable baseline on which to assess the Wylfa Newydd Project. It then goes on to highlight the modelling methodology adopted for the derivation of traffic flows that could arise from the Associated Development and Off-Site Power Station Facilities, the A5025 Highway Improvements and the construction and operational phases of the Wylfa Newydd Project.

The outputs/results will form part of the EIA and operational traffic assessments. At this time, Jacobs is working to an assumption that decommissioning of the Power Station is assumed commensurate with the decommissioning impacts associated with the Existing Power Station. As such, no allowance has been made for decommissioning activities within the Traffic Model or any assessment years. In addition, Associated Development decommissioning has not been specifically included in the modelling because it does not fall within any of the assessed years. The level of total construction traffic flows during decommissioning of Associated Development is lower than the traffic flows during the 2023 modelled year.

The scope of the Traffic Model does not include modelling of the following:

- on-site traffic movements as these are off the public highway;
- local trips during periods off-shift (shopping, leisure etc.);
- monetised benefits/benefit – cost ratio/value for money; and
- any decommissioning activities associated with the main site or Associated Development/Off-Site Power Station Facilities (see paragraph above).

Individual junction assessments are presented in App C2-4 DCO Transport Assessment (Application Reference Number: 6.3.14), micro-simulation modelling of A55 Britannia Bridge is described in - DCO TA Appendix I - VISSIM Model Results (Application Reference Number: 6.3.23), accident analysis is provided as App C2-4 - DCO TA Appendix E - Accident Analysis (Application Reference Number: 6.3.19) and journey time assessments are undertaken in App C2-2 - Journey Time Calculations (Application Reference Number: 6.3.12).

3. Traffic Model Development

3.1 Introduction

A Strategic Traffic Model has been developed to calculate the volume of traffic flows on the surrounding road network related to the proposed activities associated with the development of the Wylfa Newydd Project. The modelling methodology has been presented to both the IACC and the Welsh Government and is explained below.

The Traffic Model represents an extensive and complex macro-based model developed in Microsoft Excel. Excel is considered to represent the most appropriate platform in which to develop a model of such scale and complexity. The Excel functionality enables the model to 'switch on and switch off' the numerous components and aspects of the Wylfa Newydd Project that cumulatively generate traffic impacts.

The development of the model to its current stage has been an iterative process that has included various updates to increase its functionality and scope in line with the changing scope of the Wylfa Newydd Project as it has evolved. Traffic flows for roads and junctions for existing and future traffic scenarios have been calculated and provided for the purpose of traffic assessments, as well as the traffic flow outputs being used as part of multi-disciplinary assessments for EIA purposes. To this end, the purpose of the Traffic Model is to provide traffic flows to inform a range of documentation in relation to supporting the necessary planning approval for the Power Station. Therefore, the model has been developed specifically to provide the required level of multi-purpose functionality and flexibility which has resulted in development of a fit for purpose tool for understanding traffic flows associated with the Wylfa Newydd Project and resulting environmental effects.

3.2 Model Versions

The development of the Traffic Model has occurred since 2014, during which three versions of the model have been developed and used to provide outputs required at specific stages of the Wylfa Newydd Project. It is considered pertinent to describe the evolution of the model as its scope, functionality and process have been developed. This evolution has to a large extent informed the current format of the model as additional functionality has been required through the evolution of the Wylfa Newydd Project.

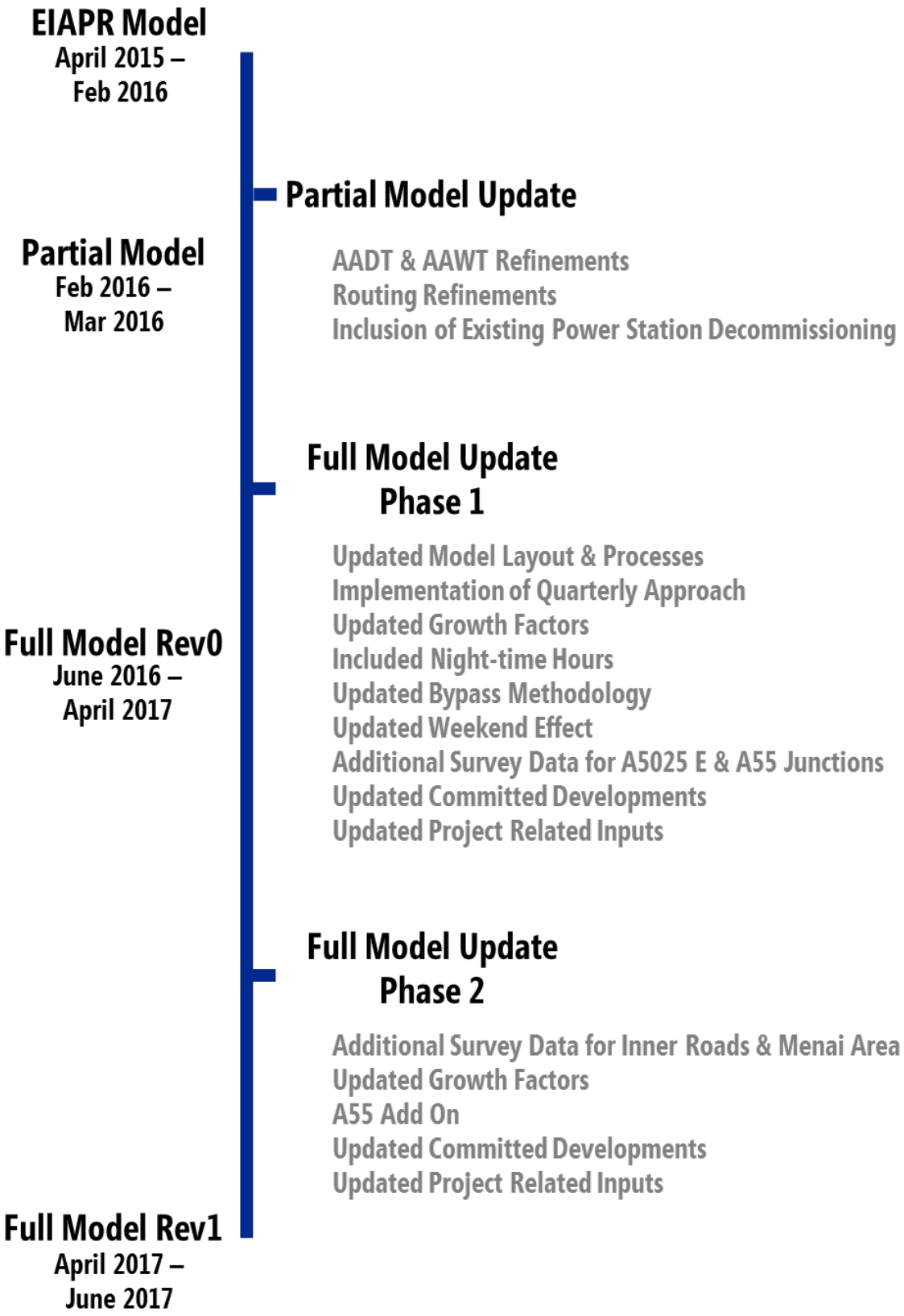
It also highlights the specific alterations that have been implemented to best represent the various bespoke elements of the Wylfa Newydd Project; highlighting its fitness for purpose and the benefits of developing an Excel-based Traffic Model.

The model evolution can be identified in three key stages; these model versions, identified in Figure 3.1, are described in more detail in Section 3.2 including their scope, functionality and limitations.

An earlier iteration and less extensive version of the model has been used to inform preparatory documentation provided for stakeholders and public orientation associated with earlier stages of the Project, which was considered suitable for the purpose of supporting the extent of these assessments at the time. Since then, a more fundamental update of the model has been undertaken to develop the model to its current extent and form.

The purpose of the updated and more detailed version of the model is to inform the technical analysis and technical documentation supporting the EIA for the application for the DCO.

Figure 3.1: Model development flow chart



3.2.1 Environmental Impact Assessment Progress Report (EIAPR) Strategic Traffic Model

The Traffic Model was originally developed to provide analysis to support the Preliminary Environmental Information Report (PEIR), now known as the EIAPR for PAC2.

Traffic surveys undertaken in 2014 at this time were used to furnish the model based on the network extent agreed with Horizon at the time (further information relating to data collection is provided in Section 4.2). The model also included Wylfa Newydd Project related information that was made available to Jacobs at that time. The extent of the EIAPR Traffic Model included the following key roads:

- A5025 from A5 (Valley) to Amlwch; and
- A55 from Holyhead to Junction 12 (Bangor).

These roads were identified for inclusion in the EIAPR model as they were considered to represent the routes where an increase in traffic relating to the Wylfa Newydd Project activity would most likely be seen, based on the information available at the time.

The first iteration of the model was more basic than the current model. Both the surveyed traffic and predicted traffic flows associated with the Wylfa Newydd Project were calculated on a 'peak' and 'off-peak' basis to allow for variation in activity over a year. Peak weeks represented six weeks of the year (six weeks of higher volumes of traffic due to the holiday season) and 46 off-peak weeks, representing the network under normal conditions.

3.2.2 Partial Strategic Traffic Model

The EIAPR model was partially updated reflecting the most appropriate information available to Jacobs at the time, to support the early *Town and Country Planning Act 1990* applications (such as Site Preparation and Clearance). The main additional refinements implemented as part of the Partial Model updates involved establishing that the effect of the Existing Power Station and the decommissioning of the Existing Power Station were fully accounted for in the baseline traffic flows. In addition, the model was updated with revised routings and timings in relation to the proposed use of the Logistics Centre and committed developments included in the model.

At this stage, the model retained its original layout, functionality and processing capability. However, the inclusion of data associated with the Existing Power Station, which involved a significant increase in routings, highlighted the need to consider a more streamlined process/structure for undertaking the various calculations.

3.2.3 Full Model Rev0

As the Project evolved and the full functionality requirements of the model became clear in terms of its flexibility and scope, it became necessary to implement an alternative processing approach, given the larger data handling requirements. Therefore, a VBA (macro) orientated approach to manage more calculations of increased complexity and scale was implemented. These enabled further modelling functions to be implemented across a suite of excel spreadsheets, reducing the risk of processing high volumes of data (and risking computational failures). All inputs were therefore separated into individual spreadsheets by element (alongside associated output sheets), across the various time periods being assessed. Additionally, the model structure was developed to specifically manage key impacts associated with the Wylfa Newydd Project, such as the weekend effect and variations in construction activity over time. This required the structure to be split into specific years, specific days of the week and by quarter to allow sufficient Project-related detail to be captured.

This process both increased the detail and accuracy of the model as well as the efficiency of the modelling itself (both inputting data and calculation time improvements). The updated modular structure is broken down into two key components: the first involves specifying individual staff and traffic input values for individual components within an element (i.e. construction of the Park and Ride, the operational workers to operate the Park and Ride and the user-effect of operating the Park and Ride by year).

Additionally, the second of these key components allows this 'headline' information to be fed into a second data input area, one in which specific routing and timing assumptions for each input component have been defined (using a percentage based proportional approach). This ensured that the impacts of each element/component are assigned in the correct magnitude and to the correct route and time of day.

The VBA platform increased the automation of the model, providing a more stable platform that is both easier to analyse and manage. Additionally, a standalone output results manager has been created which shows all the data outputs completed by the model in each run. A new user-interface has been created to allow users to define which links, time periods and days are required as outputs.

3.2.4 Full Model Rev1

Following the updates to the Wylfa Newydd Project following the project optimisation, a second phase of updates was required to capture additional requests and support the Development Consent Order application. This primarily focused on extending the model scope to cover additional traffic surveys undertaken on the inner roads and the Menai Bridge crossing.

As the Wylfa Newydd Project optimisation and the inclusion of additional links/junctions led to a number of fundamental changes with regards to modelling inputs and routing assignment, it was necessary to capture all of these changes for both the Wylfa Newydd Project and committed developments alike. The model structure, functionality and processing has been retained from the earlier Phase 1 Full Model update.

The following chapter provides a detailed overview of the model structure, processes and functionality set in the context of the iterative updates that have resulted in the current model platform status.

It should be noted that the remaining sections of this Method Statement reflect the functionality, processes and scope of the Full Strategic Traffic Model, Rev 1 alongside the assumptions that underpin this current version of the model which are provided in the Strategic Traffic Model Assumptions Report.

4. Modelling Development

4.1 Survey Data

It should be noted that the development of the model and the undertaking of traffic survey data to underpin the model has been an iterative process. The scale and extent of the model has increased over time in response to the evolving nature of the Wylfa Newydd Project. As such, a number of surveys have been undertaken during the course of the model development to reflect its current status and this section provides a summary of this process.

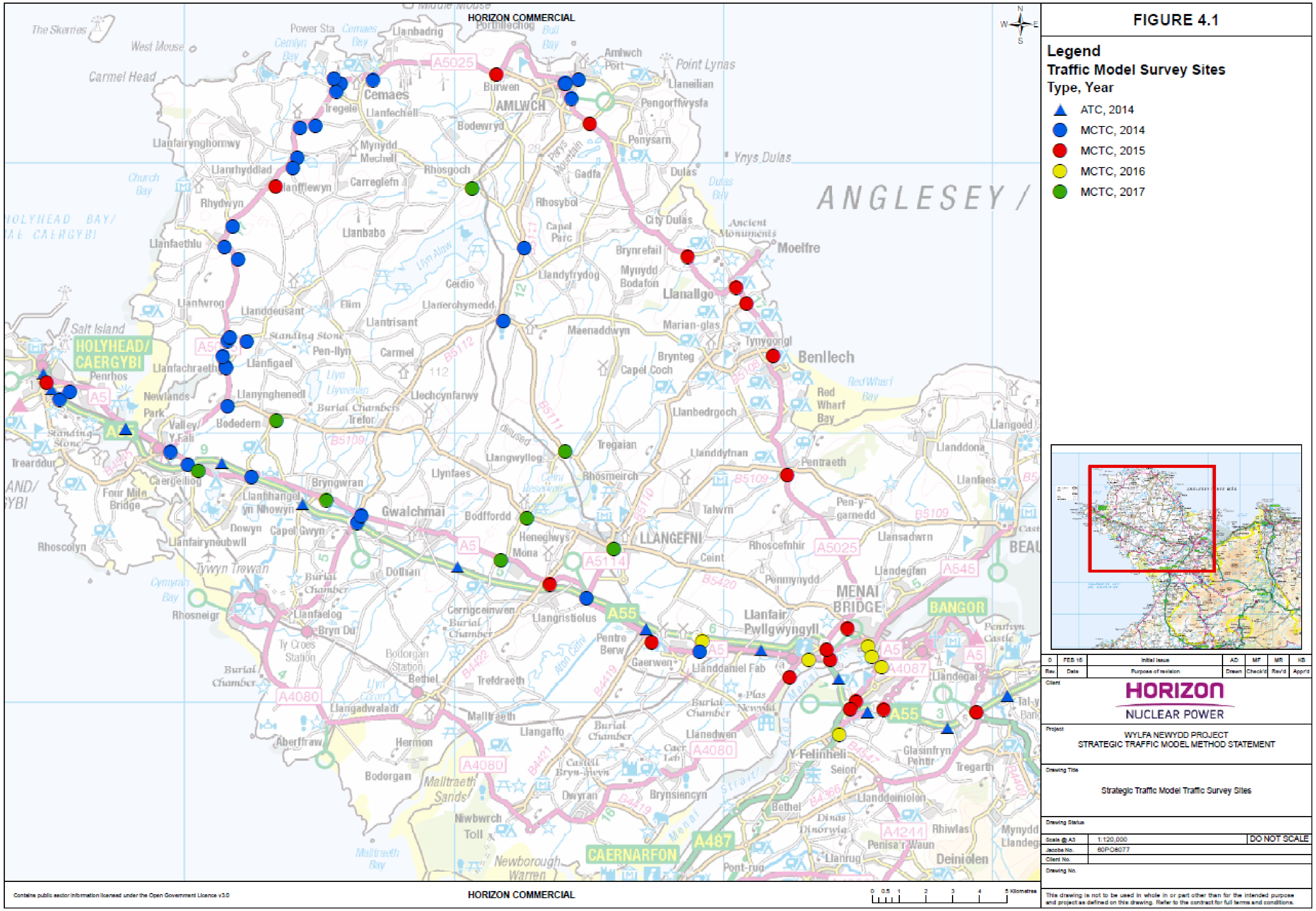
Manual Classified Turning Count (MCTC) data were originally collected at 35 junctions on the A5025 and western extent of the A55 on Anglesey. Automatic Traffic Count (ATC) data were also collected at a number of locations on the A55 to supplement the MCTC data. As the Wylfa Newydd Project has evolved, additional surveys were conducted between 2015 and 2017. This ensured the model captured all links that were most likely to witness a material change in traffic flow as a result of the Wylfa Newydd Project. For all surveys commissioned, the vehicle data have been aggregated into the following categories, including:

- cars;
- LGVs;
- PSVs;
- OGV1 – (as MGV) Goods vehicles of between 3.5 and 7.5 tonnes; and
- OGV2 – (as HGV) All goods vehicles over 7.5 tonnes.

All vehicle classes identified above are included separately within the Traffic Model. Additionally, the structure of the model has been developed such that the development-related traffic activity associated with each vehicle class can be specified and separately inputted. Therefore, the associated impact of each element can be independently and accurately identified. Further information relating specifically to these items is provided later in this report.

Figure 4.1 identifies the location of the junctions that have been surveyed to form the baseline information included in the model.

Figure 4.1: Traffic Survey Locations



4.1.1 2014 Surveys

The MCTC surveys were completed for a 14-hour period, from 06:00 to 20:00, on two days in August and two days in November 2014. The surveys were undertaken on:

- Thursday 28th August;
- Saturday 30th August;
- Thursday 27th November; and
- Saturday 29th November.

These days were chosen as a Thursday is considered to be representative of a typical weekday (and can therefore be used as a proxy for Monday to Wednesday and Friday flows), and Saturday is considered to be representative of a typical weekend day (and therefore can be used as a proxy for Sunday).

The months of August and November were chosen to represent the traffic during the busiest month of the year (i.e. August – traffic is generally highest in August, as it is representative of the tourist season), and a month of the year when traffic is operating normally (i.e. November) without any seasonal impacts.

4.1.2 2015 Surveys

As the Wylfa Newydd Project has evolved, it has become clear that the extent of the road network where changes in traffic flow are likely to be observed has widened.

Therefore, additional traffic surveys have been required to capture a wider scope of junctions and links that have also subsequently been included in the updated Traffic Model. These additional surveys were undertaken in August and September 2015 at a number of locations on the A5025 east. Additionally, surveys were undertaken on Britannia Bridge and a number of junctions on the A55 on the mainland in May 2015. Again, these surveys were undertaken in peak and 'neutral' months that were considered to reflect peak seasonal activity and standard network operation, ensuring consistency with earlier data counts. Additionally, surveys were also undertaken on Thursdays and Saturdays, including:

- Thursday 21st May;
- Saturday 23rd May;
- Thursday 27th August;
- Saturday 29th August;
- Thursday 24th September; and
- Saturday 26th September.

4.1.3 2016 and 2017 Surveys

After the Wylfa Newydd Project optimisation, it was agreed that additional survey data would be included within the Strategic Traffic Model. This would ensure greater coverage across Anglesey on a number of minor routes that had previously not been considered. Additionally, it would provide an extension to the model on the mainland along the A55 corridor to capture the effects of the Wylfa Newydd Project in this area and on both Menai Straight crossings.

In addition to the Strategic Traffic Model, Jacobs has developed a VISSIM micro-simulation model that seeks to assess the impacts of the Wylfa Newydd Project on the Menai Strait crossings, namely Britannia Bridge and the Menai Bridge. This is a much more focussed model that seeks to identify traffic impacts at a very local level and was commissioned separately to the Strategic Traffic Model. A number of traffic surveys were commissioned in 2016 to support the VISSIM model on the A55 corridor around the Menai Straight. Due to programme constraints at the time, it was not feasible for additional surveys to be undertaken at this location that would ensure exact consistency with earlier surveys undertaken in 2014

and 2015 for the Strategic Traffic Model. Therefore, it was agreed with Horizon that the surveys undertaken as part of the VISSIM modelling would be used and also included in the Strategic Traffic Model.

As the VISSIM model was commissioned separately, and sought to achieve slightly different objectives, the survey data did not match the survey data already included in the Strategic Traffic Model, in terms of hours surveyed and time of year. However, the data used within the VISSIM model has been factored to ensure consistency with the previous data included within the Strategic Traffic Model and ensure a degree of consistency between the Strategic Traffic Model and VISSIM traffic model

The surveys undertaken for the VISSIM model and also included within the Strategic Traffic Model covered 04:00 to 22:00 on two days. The surveys were undertaken on the following dates in 2016:

- Thursday 30th June; and
- Sunday 3rd July.

Further surveys were undertaken to capture traffic movements on a number of the inner minor roads on the island. This would allow the model to represent more accurately the traffic routings in this area, on links that were previously not assumed to be impacted by the Wylfa Newydd Project. These surveys were undertaken between the hours of 06:00 to 20:00 for the following dates in 2017

- Thursday 6th April; and
- Saturday 8th April.

The inclusion of a number of minor roads in the model resulted from the evolving nature of the Wylfa Newydd Project following project optimisation. Therefore, it was not possible to ensure complete consistency between the surveys undertaken on the minor roads and those undertaken in 2014 and 2015. Due to programme constraints at the time, these additional surveys had to be undertaken in April. However, factoring processes were utilised to ensure the data applied within the model was consistent and re-weighted to a standardised base. The factoring processes adopted are discussed further in later sections of this report.

4.1.4 Survey Data Format

All junction turning count data captured from the various traffic surveys have been input into the model in the format as shown in Figure 4.2. This master sheet of all raw traffic count data has been used to allow for an effective method of calculating vehicle flows and furthermore correctly assigning and combining these flows at the output stage.

This master sheet provides the platform for providing unique identifiers for each turning movement at each individual junction. Each junction has been given a unique site reference (i.e. 1), and each turning movement provided with a to/from arm identifier linked to the site reference (i.e. 1_A_B) reference (by site number). These unique identifiers form the basis of generating routings associated with Wylfa Newydd Project-related activity, as described later in this report.

The model is therefore furnished with a comprehensive list of individual turning movements, sub-set by hour and vehicle class for each junction that has been surveyed. This functionality allows the model to build assessment scenarios in various 'blocks' depending on what inputs have been prescribed by using a number of lookup functions in Excel to capture the correct turning movements. The process used for defining the turning movements within the various routings is explained in further detail in Section 4.8.

Figure 4.2: Modelled surveyed data layout

				1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
				AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	IP	IP	IP	IP	IP
				6_7	6_7	6_7	6_7	6_7	7_8	7_8	7_8	7_8	7_8	8_9	8_9	8_9	8_9	8_9	9_10	9_10	9_10	9_10	9_10
Site			Movement	Cars	LGV	OGV1	OGV2	PSV	Cars	LGV	OGV1	OGV2	PSV	Cars	LGV	OGV1	OGV2	PSV	Cars	LGV	OGV1	OGV2	PSV
A	A	1	1_A_A	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A	B	1	1_A_B	32	1	3	1	0	61	24	6	1	0	38	19	8	2	0	88	16	5	3	1
A	C	1	1_A_C	4	1	0	0	0	14	0	0	0	0	37	10	0	0	0	63	11	3	0	0
A	D	1	1_A_D	10	0	2	0	0	24	6	3	0	0	45	7	3	1	0	53	15	8	1	0
A	E	1	1_A_E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A	F	1	1_A_F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B	A	1	1_B_A	11	2	4	0	0	47	14	4	1	0	86	10	3	3	0	78	17	6	4	0
B	B	1	1_B_B	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
B	C	1	1_B_C	2	3	0	0	0	16	5	0	0	0	22	4	0	0	0	34	7	2	0	0
B	D	1	1_B_D	35	9	18	20	3	93	18	27	30	7	166	35	21	23	13	215	38	22	31	16
B	E	1	1_B_E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B	F	1	1_B_F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C	A	1	1_C_A	12	2	0	0	0	27	5	3	0	0	44	14	1	0	0	109	8	2	0	0
C	B	1	1_C_B	10	2	0	0	0	43	2	0	0	0	40	2	1	0	0	48	1	1	0	0
C	C	1	1_C_C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C	D	1	1_C_D	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	8	1	1	0	0
C	E	1	1_C_E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C	F	1	1_C_F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D	A	1	1_D_A	38	2	0	0	0	61	8	2	0	0	99	17	3	0	0	150	15	2	0	1
D	B	1	1_D_B	65	18	31	34	6	148	24	16	21	15	120	28	14	21	16	93	28	19	22	13
D	C	1	1_D_C	1	1	0	0	0	1	0	0	0	0	1	0	0	0	0	4	0	0	0	0
D	D	1	1_D_D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D	E	1	1_D_E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D	F	1	1_D_F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	A	1	1_E_A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	B	1	1_E_B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	C	1	1_E_C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	D	1	1_E_D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	E	1	1_E_E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	F	1	1_E_F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	A	1	1_F_A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	B	1	1_F_B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	C	1	1_F_C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	D	1	1_F_D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	E	1	1_F_E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	F	1	1_F_F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A	A	2	2_A_A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
A	B	2	2_A_B	4	1	1	0	0	11	6	0	0	0	49	3	0	1	1	53	10	3	1	1
A	C	2	2_A_C	8	1	0	0	0	14	0	0	0	0	31	2	1	0	1	31	4	0	1	1
A	D	2	2_A_D	26	3	0	0	3	64	15	0	0	2	93	22	3	0	1	118	14	3	0	0
A	E	2	2_A_E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

4.2 Factoring Adjustments

4.2.1 Seasonal adjustments

As described earlier, the Traffic Model has evolved over time and has been populated with traffic count data undertaken in different years and importantly at different times of the year. This potentially impacts on the consistency of the data used in the model across its wide area of coverage given potential seasonal variations in traffic flows. There are a number of key purposes that the traffic model was originally developed for; the first was to generate worst-case peak outputs to reflect worst case traffic conditions. The second was to generate accurate Annual Average Daily Traffic (AADT) and Annual Average Weekly Traffic (AAWT) outputs for other technical disciplines. It has therefore been necessary to ensure that the model generates stable outputs across the full area of coverage to ensure that these key outputs can be maintained, despite the various input data sources being used. Therefore, a standard approach to all data factoring has been employed to ensure commonality across all base data.

To ensure consistency with the August and November (peak and off-peak) data captured in 2014, it has been necessary to factor the additional data that was captured in April, May, June, July and September to generate appropriately weighted neutral November and peak August flows to incorporate into the model. This process was also carried out for any surveys that did not include an August counterpart (the 2015 May data, 2016 data from June and July, and the 2017 April data).

This process has been undertaken using a permanent ATC site located to the south of Llanfachraeth on the A5025. This site was used because it has reliable data covering a full 12-month period (from 2014); therefore, allowing for monthly conversion factors to be calculated. It should also be noted that the model updates have been undertaken on an iterative basis to reflect the changing project information. Due to time constraints associated with updating the Strategic Traffic Model and the very specific nature of the

model updates (for example introducing a need to factor between months which was not required at the outset); the A5025 ATC data site at Llanfachraeth represented the only available site with a full 12 months' dataset. Due to the time constraints; it was not possible to collect all the required additional ATC data for use in the factoring methodology. Despite this, further checks were undertaken to ensure the robustness of the ATC site south of Llanfachraeth for generating monthly conversion factors. This has been undertaken based on the daily profile of the data from ATC sites that is available for the same month; by comparing ATC data for August between three sites; the permanent ATC site at Llanfachraeth and ATCs in Amlwch and Menai Bridge. The results of this comparison are shown in Table 4.1 in Section 4.3 below, which shows a very marginal difference for the profiling of traffic across the missing night-time hour factors that have been derived for each ATC site. This provided confidence that the site used (namely that of Llanfachraeth) was suitable for factoring any traffic count data sourced on the wider A5025 and local road network that was not aligned with the original November and August neutral / peak data.

Using the average daily flows for Thursdays and Saturdays in the surveyed and the target months, factors have been calculated using the average Thursday and average Saturday traffic data for each month. These factors have been applied to the surveyed months' traffic flows to convert them to a 'November' or 'August' month to ensure consistency across the model with the application and use of neutral November and peak August traffic flows. For the 2016 Sunday data, this conversion was completed using the same methodology except for Sunday as opposed to Saturday. Additional factoring was then applied to convert this from a Sunday to a Saturday using the permanent ATC to provide Sunday to Saturday factors.

A combination of data has been incorporated in the model relating to the A55. Firstly, ATC data for the A55 was requested from UK Highways Jacobs were unable to commission ATC surveys on the A55 due to safety issues associated with installation of the equipment and therefore were entirely reliant on the data provided by UK Highways. Due to the commercial sensitivities, the ATC data provided for locations on the A55 by UK Highways are limited to four different months over a 12-month period (including August and November).

Additionally, the data includes the junction turning movements for all A55 junctions in the study area (initially junction 1 to 7 and subsequently 8 to 11). The initial survey data for junction 1 to junction 7 covered the neutral and peak periods of November and August. The surveys for junction 8 to 11 were undertaken in May. However, ATC data was not provided for May, therefore these turning count surveys could not be factored using A55 ATC data. Instead, the A5025 permanent site was used to adjust the on and off slip movements (not the A55 through flow or inter junction link movements, as these were captured in the ATC link data). Again, to ensure robustness, a comparison was undertaken to ensure that the use of the A5025 permanent ATC site south of Llanfachraeth was robust for application to the A55. This was undertaken using a manual surveyed site on the A5025 within the vicinity of Llanfachraeth and the A55 link flows at Britannia bridge. This compared the August to November factors between 6:00 and 20:00 and found a negligible difference. This provided confidence that this data could be used to convert the junction related movements of the A55 between junction 7 and junction 11.

The seasonal adjustments have been applied to the on/off turning movements at each A55 junction captured in the model. Given that these flows route directly on or off the local roads on Anglesey, the use of the ATC site on the A5025 is considered appropriate and would not result in any distortion of the possible ferry traffic on the A55 mainline flows.

It should be noted that the link flows derived as outputs from the model are built up from the various individual junction turning movements that represent the raw data included in the model. Further detail relating to model outputs is provided in Section 5.3 of this report. It should be noted that mainline flows on the A55, between Junction 1 at Holyhead and Junction 11 on the mainland, have also been generated manually from the ATC data, rather than based on surveys specifically. This has been calculated by adding/subtracting the on-slip and off-slip movements at each junction from west to east (based on the junction turning flows from the westernmost roundabout junction on the A55 at Holyhead).

On this basis, all non-November and non-August traffic flows have been factored to represent a typical neutral November month and peak August month using the methodology described above. This ensures full consistency across the model and all surveyed locations and stability of the outputs.

The use of the factored August and November data also ensures that the model structure, which is based on a quarterly breakdown, can be applied both to base traffic and Project-related traffic consistently. Further information relating to the implementation of a quarterly model structure is provided in Section 5.1 and how the data has been used for this purpose; highlighting the importance of being able to utilise a consistent data source.

4.3 Increased Number of Modelled Hours

The previous versions of the model included traffic data covering the specific hours that were included in the traffic surveys undertaken (06:00 to 20:00). As the Wylfa Newydd Project evolved, it became clear that the model would need to be extended to include all 24-hours of a day due to potential sensitivities during such hours identified through preliminary multi-disciplinary environmental impact assessments.

Therefore, the model has been updated to include all 24 hours to ensure that associated traffic impacts (such as night shift changeovers) are accurately reflected in the correct hourly period. As part of this process, it has been necessary to derive appropriate adjustment factors to estimate night-time turning count data as the 2014, 2015 and 2017 surveys undertaken only capture 14 hours of a 24-hour period, and the 2016 surveys only capture 19 hours of a 24-hour period. This process has been undertaken for all the hours not previously included in the model (and not covered by existing surveyed data), such that all 24 hours of a day have been calculated and are therefore now included in the model. The model therefore now has the functionality to generate hourly outputs for all 24 hours of a day.

The 14 hours listed below represent the hours captured by raw traffic survey data (and therefore input directly into the model).

- 06:00–07:00;
- 07:00–08:00;
- 08:00–09:00;
- 09:00–10:00;
- 10:00–11:00;
- 11:00–12:00;
- 12:00–13:00;
- 13:00–14:00;
- 14:00–15:00;
- 15:00–16:00;
- 16:00–17:00;
- 17:00–18:00;
- 18:00–19:00; and
- 19:00–20:00;

In order to ensure the model can be used for a variety of disciplines and purposes, specifically in relation to assessing traffic conditions during the night-time shift changeover, additional traffic flows have been generated. This has been undertaken using a factoring methodology to incorporate the following additional hours in the model, using the method outlined below.

- 20:00–21:00;

- 21:00–22:00;
- 22:00–23:00;
- 23:00–24:00;
- 00:00–01:00
- 01:00–02:00;
- 02:00–03:00;
- 03:00–04:00;
- 04:00–05:00; and
- 05:00–06:00.

The adjustment factors have been based on the proportion of a day each hour represents as a total of all 24-hours (based on ATC data profiles, as highlighted below). These factors have then been applied to the sum of the surveyed traffic data (14 hours' worth of data) in order to generate an appropriately weighted volume of traffic to reflect the missing night-time traffic hours.

These adjustment factors for the missing night-time hours at all A5025 locations included in the model have been generated using 24-hour ATC data, from a permanent site on the A5025 near Llanfachraeth. For the A55 junctions, the closest available A55 ATC sites to each surveyed junction have been used.

Jacobs has also been provided with ATC data from August at locations close to Amlwch and Menai Bridge on the A5025. The proportion that the missing night time hours represent of a full 24-hour traffic count have been compared across the three ATC sites available on the A5025 and found to be highly correlated. This is shown below for data available for August, for the missing night-time hours.

Therefore, given that the ATC site at Llanfachraeth on the A5025 represents the only site with data available for August and November; it was considered suitable to apply to all locations on the A5025 for the purpose of generating missing night-time hours.

By utilising ATC data from both the A55 and A5025, and applying these profiles to generate the missing night-time hours for traffic on the A5025 and A55 turning counts, this method therefore improves the accuracy of the model by ensuring any differences in traffic profile over a typical day between the A5025 and A55 have been fully captured.

These factors were generated by dividing the hourly flow for each of the 10 missing night-time hours, within the permanent ATC, by the total of the 14 originally surveyed hours in the permanent ATC. Using the factors shown in Table 4.1 for the Permanent ATC site, if the total 14-hour flow was 1000 vehicles for a specific movement on a Thursday, the total 05:00-06:00 hourly flow for a Thursday would be 1000 vehicles multiplied by 0.07, giving an hourly flow of 70 vehicles.

Table 4.1: August Monthly Factors by ATC Site

Hour	August Monthly Factors					
	Permanent ATC		A5025 E Site 1 (AMLWCH) - August only		A5025 E Site 4 (MENAI BRIDGE) - August only	
	Thursday	Saturday	Thursday	Saturday	Thursday	Saturday
00:00:00	0.05	0.09	0.04	0.09	0.05	0.10
01:00:00	0.02	0.06	0.05	0.05	0.03	0.04
02:00:00	0.01	0.03	0.02	0.06	0.02	0.02
03:00:00	0.01	0.02	0.02	0.02	0.02	0.02
04:00:00	0.03	0.02	0.03	0.03	0.02	0.02
05:00:00	0.07	0.04	0.06	0.08	0.07	0.09
06:00:00						
07:00:00						
08:00:00						
09:00:00						
10:00:00						
11:00:00						
12:00:00						
13:00:00						
14:00:00						
15:00:00						
16:00:00						
17:00:00						
18:00:00						
19:00:00						
20:00:00	0.49	0.50	0.48	0.56	0.55	0.46
21:00:00	0.37	0.35	0.39	0.42	0.40	0.32
22:00:00	0.22	0.26	0.18	0.30	0.24	0.22
23:00:00	0.14	0.15	0.07	0.21	0.11	0.14

The model has been updated to include additional hourly base data using the methodology outlined above, representative of all 24 hours of a day. Therefore, the AADT and AAWT flows can be generated directly by adding the relevant hours included in the model. This reduces the need to apply AADT/AAWT factors and generally reduces the level of factoring to 10 hours out of 24. Therefore, the level of factoring is reduced, providing more accurate AADT and AAWT outputs.

4.4 Traffic Growth

In order to provide an accurate prediction of future baseline traffic in the study area, growth factors have been applied to the surveyed flows to account for background increases in traffic, such as changes in car ownership and demographics (e.g. employment, population and housing).

4.4.1 Car and PSV Factors

The factors for cars and PSVs have been derived using National Trip End Model (NTEM) data (these being updated to enable the use of the most up-to-date version of the national Trip End Model Presentation Program (TEMPro) - version 7.2 was released in March 2017). NTEM forecasts for the Isle of Anglesey have been extracted from TEMPro.

The model includes all 24-hours of a day and therefore appropriate traffic growth factors have been applied to each specific hour. For weekdays, the 24 hours of the day have been categorised according to the time period split in TEMPro and appropriate factors from TEMPro derived for each time period for cars and PSVs between 2016 and each year to 2035. These included the following:

- daytime Off-peak hours: 00:00–07:00;
- AM peak hours: 07:00–10:00;
- inter-peak hours: 10:00–16:00;
- PM peak hours: 16:00–19:00; and
- night-time hours: 19:00–00:00.

Average daily factors have been provided for all 24 hours of Saturday and Sunday.

NTEM factors have been extracted by the above time periods for Isle of Anglesey, then further adjusted using National Transport Model (NTM) forecast data for Wales to further refine the published traffic forecast. The model has the full suite of traffic growth factors embedded within it; and therefore all base (2016) traffic flows for each hour are multiplied by the correct traffic growth factor by vehicle type as an initial step; once the forecast year has been specified and a model run initiated.

4.4.2 LGV and HGV Factors

Locally adjusted NTEM forecasts are not available for LGV, OGV1 or OGV2 trips. Therefore, the annual growth factors for these vehicle classes have been established using the NTM forecasts. NTM forecasts give background traffic growth by region, road type and area type (urban or rural).

4.4.3 Growth Factors

It should be noted that the model provides the functionality to generate scenario outputs for any year between 2016 and 2035. Therefore, all future year traffic growth factors have been pivoted off a base year of 2016 (i.e. 2015 base data have been uplifted to reflect a 2016 base year) and the full suite of growth factors for each year up to 2035 are captured, using 2016 as a pivot. Of the previous years, 2014 surveyed data had already been factored to 2015 using a previous version of TEMPro and used for the previous assessments undertaken using superseded versions of the Traffic Model. The model includes all the growth factors summarised in the following tables and uses a ‘lookup’ function to apply the relevant factor to each vehicle classification and base flows by time period once a user has selected a base year and initiated a model run.

The following section details the traffic growth factors that have been applied in the model, broken down by day of the week, vehicle class and time periods; AM, Interpeak (IP), PM and Off-peak.

Table 4.2: 2015 to 2016 growth factors

2015 growth factors																				
	AM	AM	AM	AM	AM	IP	IP	IP	IP	IP	PM	PM	PM	PM	PM	Off-peak	Off-peak	Off-peak	Off-peak	Off-peak
	Cars	LGV	OGV1	OGV2	PSV	Cars	LGV	OGV1	OGV2	PSV	Cars	LGV	OGV1	OGV2	PSV	Cars	LGV	OGV1	OGV2	PSV
Weekday	1.009	1.028	1.006	1.013	0.991	1.016	1.028	1.006	1.013	0.995	1.011	1.028	1.006	1.013	0.991	1.011	1.028	1.006	1.013	0.990
Saturday	1.015	1.028	1.006	1.013	0.996	1.015	1.028	1.006	1.013	0.996	1.015	1.028	1.006	1.013	0.996	1.015	1.028	1.006	1.013	0.996
Sunday	1.015	1.028	1.006	1.013	0.995	1.015	1.028	1.006	1.013	0.995	1.015	1.028	1.006	1.013	0.995	1.015	1.028	1.006	1.013	0.995

This allows for a seamless navigation, whichever year is chosen, using the model to generate appropriate baseline flows. Despite the inclusion of 2017 traffic data, the overall volumes of traffic and their expected traffic growth are of the same magnitude as 2016, with negligible traffic growth forecast between 2016 and 2017 following interrogation of the TEMPro programme.

Table 4.3 to Table 4.5 show the growth factors from 2016 to 2035 for weekdays, Saturdays and Sundays respectively.

Table 4.3: Weekday growth factors

Weekday growth factors																				
	AM	AM	AM	AM	AM	IP	IP	IP	IP	IP	PM	PM	PM	PM	PM	Off-peak	Off-peak	Off-peak	Off-peak	Off-peak
	Cars	LGV	OGV1	OGV2	PSV	Cars	LGV	OGV1	OGV2	PSV	Cars	LGV	OGV1	OGV2	PSV	Cars	LGV	OGV1	OGV2	PSV
2016	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2017	1.013	1.028	1.006	1.013	0.990	1.012	1.028	1.006	1.013	0.984	1.012	1.028	1.006	1.013	0.985	1.011	1.028	1.006	1.013	0.982
2018	1.011	1.055	1.011	1.025	0.980	1.024	1.055	1.011	1.025	0.968	1.024	1.055	1.011	1.025	0.971	1.022	1.055	1.011	1.025	0.963
2019	1.039	1.083	1.017	1.038	0.970	1.035	1.083	1.017	1.038	0.952	1.036	1.083	1.017	1.038	0.956	1.033	1.083	1.017	1.038	0.945
2020	1.052	1.111	1.023	1.050	0.960	1.047	1.111	1.023	1.050	0.936	1.048	1.111	1.023	1.050	0.941	1.044	1.111	1.023	1.050	0.926
2021	1.060	1.138	1.026	1.064	0.950	1.054	1.138	1.026	1.064	0.920	1.055	1.138	1.026	1.064	0.927	1.050	1.138	1.026	1.064	0.908
2022	1.067	1.166	1.029	1.078	0.943	1.061	1.166	1.029	1.078	0.912	1.061	1.166	1.029	1.078	0.919	1.057	1.166	1.029	1.078	0.898
2023	1.074	1.193	1.031	1.092	0.937	1.068	1.193	1.031	1.092	0.904	1.068	1.193	1.031	1.092	0.911	1.063	1.193	1.031	1.092	0.888
2024	1.081	1.220	1.034	1.105	0.931	1.076	1.220	1.034	1.105	0.896	1.075	1.220	1.034	1.105	0.903	1.069	1.220	1.034	1.105	0.879
2025	1.088	1.248	1.037	1.119	0.925	1.083	1.248	1.037	1.119	0.888	1.081	1.248	1.037	1.119	0.895	1.075	1.248	1.037	1.119	0.869
2026	1.093	1.274	1.042	1.132	0.919	1.089	1.274	1.042	1.132	0.880	1.087	1.274	1.042	1.132	0.887	1.080	1.274	1.042	1.132	0.859
2027	1.100	1.300	1.046	1.146	0.913	1.095	1.300	1.046	1.146	0.874	1.093	1.300	1.046	1.146	0.880	1.086	1.300	1.046	1.146	0.852
2028	1.106	1.325	1.051	1.159	0.907	1.101	1.325	1.051	1.159	0.867	1.099	1.325	1.051	1.159	0.873	1.092	1.325	1.051	1.159	0.845
2029	1.112	1.351	1.055	1.173	0.901	1.107	1.351	1.055	1.173	0.860	1.105	1.351	1.055	1.173	0.867	1.098	1.351	1.055	1.173	0.838
2030	1.118	1.377	1.060	1.186	0.895	1.113	1.377	1.060	1.186	0.853	1.111	1.377	1.060	1.186	0.860	1.104	1.377	1.060	1.186	0.831
2031	1.125	1.401	1.063	1.205	0.889	1.119	1.401	1.063	1.205	0.846	1.118	1.401	1.063	1.205	0.853	1.111	1.401	1.063	1.205	0.823
2032	1.132	1.424	1.066	1.224	0.883	1.125	1.424	1.066	1.224	0.839	1.123	1.424	1.066	1.224	0.846	1.117	1.424	1.066	1.224	0.816
2033	1.138	1.447	1.069	1.242	0.877	1.130	1.447	1.069	1.242	0.832	1.130	1.447	1.069	1.242	0.839	1.123	1.447	1.069	1.242	0.808
2034	1.144	1.471	1.072	1.261	0.871	1.136	1.471	1.072	1.261	0.824	1.135	1.471	1.072	1.261	0.832	1.128	1.471	1.072	1.261	0.800
2035	1.151	1.494	1.075	1.280	0.865	1.142	1.494	1.075	1.280	0.817	1.141	1.494	1.075	1.280	0.825	1.134	1.494	1.075	1.280	0.792

Table 4.4: Saturday growth factors

Saturday growth factors																				
	AM	AM	AM	AM	AM	IP	IP	IP	IP	IP	PM	PM	PM	PM	PM	Off-peak	Off-peak	Off-peak	Off-peak	Off-peak
	Cars	LGV	OGV1	OGV2	PSV	Cars	LGV	OGV1	OGV2	PSV	Cars	LGV	OGV1	OGV2	PSV	Cars	LGV	OGV1	OGV2	PSV
2016	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2017	1.012	1.028	1.006	1.013	0.982	1.012	1.028	1.006	1.013	0.982	1.012	1.028	1.006	1.013	0.982	1.012	1.028	1.006	1.013	0.982
2018	1.024	1.055	1.011	1.025	0.965	1.024	1.055	1.011	1.025	0.965	1.024	1.055	1.011	1.025	0.965	1.024	1.055	1.011	1.025	0.965
2019	1.036	1.083	1.017	1.038	0.947	1.036	1.083	1.017	1.038	0.947	1.036	1.083	1.017	1.038	0.947	1.036	1.083	1.017	1.038	0.947
2020	1.048	1.111	1.023	1.050	0.929	1.048	1.111	1.023	1.050	0.929	1.048	1.111	1.023	1.050	0.929	1.048	1.111	1.023	1.050	0.929
2021	1.055	1.138	1.026	1.064	0.912	1.055	1.138	1.026	1.064	0.912	1.055	1.138	1.026	1.064	0.912	1.055	1.138	1.026	1.064	0.912
2022	1.062	1.166	1.029	1.078	0.903	1.062	1.166	1.029	1.078	0.903	1.062	1.166	1.029	1.078	0.903	1.062	1.166	1.029	1.078	0.903
2023	1.070	1.193	1.031	1.092	0.894	1.070	1.193	1.031	1.092	0.894	1.070	1.193	1.031	1.092	0.894	1.070	1.193	1.031	1.092	0.894
2024	1.077	1.220	1.034	1.105	0.885	1.077	1.220	1.034	1.105	0.885	1.077	1.220	1.034	1.105	0.885	1.077	1.220	1.034	1.105	0.885
2025	1.085	1.248	1.037	1.119	0.877	1.085	1.248	1.037	1.119	0.877	1.085	1.248	1.037	1.119	0.877	1.085	1.248	1.037	1.119	0.877
2026	1.091	1.274	1.042	1.132	0.868	1.091	1.274	1.042	1.132	0.868	1.091	1.274	1.042	1.132	0.868	1.091	1.274	1.042	1.132	0.868
2027	1.097	1.300	1.046	1.146	0.861	1.097	1.300	1.046	1.146	0.861	1.097	1.300	1.046	1.146	0.861	1.097	1.300	1.046	1.146	0.861
2028	1.104	1.325	1.051	1.159	0.854	1.104	1.325	1.051	1.159	0.854	1.104	1.325	1.051	1.159	0.854	1.104	1.325	1.051	1.159	0.854
2029	1.110	1.351	1.055	1.173	0.847	1.110	1.351	1.055	1.173	0.847	1.110	1.351	1.055	1.173	0.847	1.110	1.351	1.055	1.173	0.847
2030	1.117	1.377	1.060	1.186	0.840	1.117	1.377	1.060	1.186	0.840	1.117	1.377	1.060	1.186	0.840	1.117	1.377	1.060	1.186	0.840
2031	1.124	1.401	1.063	1.205	0.833	1.124	1.401	1.063	1.205	0.833	1.124	1.401	1.063	1.205	0.833	1.124	1.401	1.063	1.205	0.833
2032	1.130	1.424	1.066	1.224	0.826	1.130	1.424	1.066	1.224	0.826	1.130	1.424	1.066	1.224	0.826	1.130	1.424	1.066	1.224	0.826
2033	1.136	1.447	1.069	1.242	0.818	1.136	1.447	1.069	1.242	0.818	1.136	1.447	1.069	1.242	0.818	1.136	1.447	1.069	1.242	0.818
2034	1.142	1.471	1.072	1.261	0.810	1.142	1.471	1.072	1.261	0.810	1.142	1.471	1.072	1.261	0.810	1.142	1.471	1.072	1.261	0.810
2035	1.148	1.494	1.075	1.280	0.803	1.148	1.494	1.075	1.280	0.803	1.148	1.494	1.075	1.280	0.803	1.148	1.494	1.075	1.280	0.803

Table 4.5: Sunday growth factors

Sunday growth factors																				
	AM	AM	AM	AM	AM	IP	IP	IP	IP	IP	PM	PM	PM	PM	PM	Off-peak	Off-peak	Off-peak	Off-peak	Off-peak
	Cars	LGV	OGV1	OGV2	PSV	Cars	LGV	OGV1	OGV2	PSV	Cars	LGV	OGV1	OGV2	PSV	Cars	LGV	OGV1	OGV2	PSV
2016	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2017	1.012	1.028	1.006	1.013	0.980	1.012	1.028	1.006	1.013	0.980	1.012	1.028	1.006	1.013	0.980	1.012	1.028	1.006	1.013	0.980
2018	1.025	1.055	1.011	1.025	0.961	1.025	1.055	1.011	1.025	0.961	1.025	1.055	1.011	1.025	0.961	1.025	1.055	1.011	1.025	0.961
2019	1.037	1.083	1.017	1.038	0.941	1.037	1.083	1.017	1.038	0.941	1.037	1.083	1.017	1.038	0.941	1.037	1.083	1.017	1.038	0.941
2020	1.049	1.111	1.023	1.050	0.921	1.049	1.111	1.023	1.050	0.921	1.049	1.111	1.023	1.050	0.921	1.049	1.111	1.023	1.050	0.921
2021	1.056	1.138	1.026	1.064	0.902	1.056	1.138	1.026	1.064	0.902	1.056	1.138	1.026	1.064	0.902	1.056	1.138	1.026	1.064	0.902
2022	1.064	1.166	1.029	1.078	0.891	1.064	1.166	1.029	1.078	0.891	1.064	1.166	1.029	1.078	0.891	1.064	1.166	1.029	1.078	0.891
2023	1.071	1.193	1.031	1.092	0.881	1.071	1.193	1.031	1.092	0.881	1.071	1.193	1.031	1.092	0.881	1.071	1.193	1.031	1.092	0.881
2024	1.079	1.220	1.034	1.105	0.871	1.079	1.220	1.034	1.105	0.871	1.079	1.220	1.034	1.105	0.871	1.079	1.220	1.034	1.105	0.871
2025	1.086	1.248	1.037	1.119	0.860	1.086	1.248	1.037	1.119	0.860	1.086	1.248	1.037	1.119	0.860	1.086	1.248	1.037	1.119	0.860
2026	1.092	1.274	1.042	1.132	0.850	1.092	1.274	1.042	1.132	0.850	1.092	1.274	1.042	1.132	0.850	1.092	1.274	1.042	1.132	0.850
2027	1.099	1.300	1.046	1.146	0.842	1.099	1.300	1.046	1.146	0.842	1.099	1.300	1.046	1.146	0.842	1.099	1.300	1.046	1.146	0.842
2028	1.105	1.325	1.051	1.159	0.834	1.105	1.325	1.051	1.159	0.834	1.105	1.325	1.051	1.159	0.834	1.105	1.325	1.051	1.159	0.834
2029	1.112	1.351	1.055	1.173	0.826	1.112	1.351	1.055	1.173	0.826	1.112	1.351	1.055	1.173	0.826	1.112	1.351	1.055	1.173	0.826
2030	1.118	1.377	1.060	1.186	0.818	1.118	1.377	1.060	1.186	0.818	1.118	1.377	1.060	1.186	0.818	1.118	1.377	1.060	1.186	0.818
2031	1.125	1.401	1.063	1.205	0.810	1.125	1.401	1.063	1.205	0.810	1.125	1.401	1.063	1.205	0.810	1.125	1.401	1.063	1.205	0.810
2032	1.131	1.424	1.066	1.224	0.801	1.131	1.424	1.066	1.224	0.801	1.131	1.424	1.066	1.224	0.801	1.131	1.424	1.066	1.224	0.801
2033	1.137	1.447	1.069	1.242	0.792	1.137	1.447	1.069	1.242	0.792	1.137	1.447	1.069	1.242	0.792	1.137	1.447	1.069	1.242	0.792
2034	1.144	1.471	1.072	1.261	0.783	1.144	1.471	1.072	1.261	0.783	1.144	1.471	1.072	1.261	0.783	1.144	1.471	1.072	1.261	0.783
2035	1.150	1.494	1.075	1.280	0.775	1.150	1.494	1.075	1.280	0.775	1.150	1.494	1.075	1.280	0.775	1.150	1.494	1.075	1.280	0.775

4.5 Committed Developments and Traffic Growth

The Traffic Model previously included limited information with regard to committed developments. After being provided with a definitive list of agreed committed developments to include within the model, it has been possible to develop a more robust reference case. The committed developments considered within the model are detailed below.

It should be noted that each development has been included in the model explicitly where traffic information is available and no manual reduction of jobs or housing has been undertaken within TEMPro for the traffic growth factors that have been applied in the model. Beneath each committed development listed below that has been included in the model, a brief description of the nature of the development and justification for not undertaking a manual correction in TEMPro has been provided.

4.5.1 Parc Cybi Stage 2.

The Parc Cybi development represents the one major employment generator of all the committed developments considered.

However, there is relatively limited information available in terms of consent and the phasing of the development and therefore Jacobs has made assumptions in relation to what land uses would come forward in what year. This has resulted in alternative development scenarios being applied to different reference case years, which also reflects the added complication of inclusion of the Logistics Centre associated with the Wylfa Newydd Project when required. This essentially creates three scenarios that are captured in various reference cases, depending on the year in question, which are outlined in detail below.- The entire Parc Cybi development area benefits from outline planning consent. This information has been derived from the Transport Statement available for the latest change of use at Parc Cybi associated with a proposed truck stop. In total, Parc Cybi benefits from outline permission for 43,272sqm of B1 office use and 16,672sqm of B2 industrial uses. Although this is permitted in outline, a sensible phased approach to the release of this land is required for the duration of the Wylfa Newydd Project construction period; and particularly the quantum of development that would be operational in the key assessment years of 2020, 2023 and 2033. This is further necessitated by the fact that the Logistics Centre is proposed to be located on a parcel of land at Parc Cybi that already benefits from outline consent. Therefore, for a large period of the Wylfa Newydd Project construction period, the use of the Logistics Centre would prohibit a large portion of the outline consented development at Parc Cybi coming forward. In order to adopt a sensible approach, Jacobs has considered the best information available to generate the three scenarios required (pre, with and post Logistics Centre). These are outlined below.

- Parc Cybi (pre Logistics Centre); - Jacobs has sourced marketing information from the Parc Cybi promoters stating that some development cells are currently being brought forward to market, which benefit from a full planning permission. These are assumed to be deliverable now and therefore not impacted by the potential location of the Logistics Centre at Parc Cybi. Therefore, the pre-Logistics Centre scenario (i.e. pre 2020); assumes that the development cells with a full planning permission will reflect committed development at Parc Cybi, representing 2,782sqm of B1 office and 10,126 of B2 industrial use. The trip rates included in the Parc Cybi Transport Statement available to Jacobs have been applied to these land areas to generate the required trip generation.
- Parc Cybi (with Logistics Centre); It is understood that the Logistics Centre would come forward at Parc Cybi from Q3 of 2020. Given the land area identified for the Logistics Centre; it is expected that this would prohibit any other of the outline consented development coming forward whilst the Logistics Centre is in operation. Therefore, during the period Q3 2020 to the end of the construction period in 2027, it has been assumed that the Logistics Centre and committed development associated with the full planning permission would co-locate at Parc Cybi. Therefore, trips relating to committed development at Parc Cybi will remain as per the previous scenario; and traffic associated with the Logistics Centre (HGVs/LGVs and facilities management) have been input directly based on information provided by Horizon, as outlined in the Assumptions Report. It should be noted consistent assumptions have been applied to a baseline and with Wylfa Newydd Project scenario in this

example (i.e. only committed development associated with full permission at Parc Cybi is included in a baseline and a Wylfa Newydd Project including the Logistics Centre).

- Parc Cybi (post-Logistics Centre) – Once the Logistics Centre ceases operating at the end of 2027, it is assumed the land on which it would be accommodated would be freed up at that point. It has therefore been considered that the remaining currently outline consented development could then come forward at Parc Cybi. Therefore, post 2027, it has been assumed the full outline consented development quantum would be applied as committed development, again using the trip rates included in the Parc Cybi Transport Assessment.

Jacobs is in receipt of a Transport Statement that identifies the impact of a change of use from the outlined consent to a truck stop for an area of the Parc Cybi site. The impacts of the truck stop are fairly localised and essentially involve the diversion of existing HGVs routing on the A55 into the truck stop; before continuing on the original journey. This diversion (based on the profile provided in the Transport Statement) has been accounted for in all the scenarios referenced above over and above what has been specified in addition to a small element of ancillary office use relating to the truck stop.

The Strategic Traffic Model has been set up in such a way that growth factors are applied on an Isle of Anglesey-wide basis, with one growth factor provided by vehicle type and time period for a relevant year. This is applied as a first step to base traffic once a model run is initiated. The complexity surrounding Parc Cybi and the need to include numerous alternative growth factors for specific reference case years depending on the committed development assumptions that are relevant to that year only came to light relatively late in the model development programme. Therefore, retro-fitting the model with the necessary structure and functionality to apply alternative growth assumption traffic growth factors for different reference case years would add significant time and complexity to the model development.

Generally, it is accepted that if including committed development traffic explicitly in a model, a manual reduction to the TEMPro growth factors used is normally required so that committed development traffic is not double counted. However, for the reasons identified above this has not been possible within the current model structure. It has been identified that only committed development trips associated with Parc Cybi would be of a significant number to potentially represent a material double counting alongside the application of unadjusted TEMPro growth factors. The remaining committed developments considered later in this section have been reviewed and found to represent alternative development types that are temporary (i.e. construction related effects or very small to not result in any significant degree of double counting).

Therefore, Jacobs has undertaken a sensitivity assessment to understand the nature of any double counting relating to Parc Cybi that might be present in the model based on the methodology adopted. The number of full-time equivalent (FTE) jobs that Parc Cybi development would generate has been established, using the land areas specified in each of the three key scenarios summarised above. These calculations have been based on guidance outlined in the Employment Densities Guide, 2nd Edition, 2010. The growth factors generated from TEMPro have been re-generated with the number of FTE jobs manually deducted for the key assessment years of 2020, 2023 and 2033.

This highlights that the level of variance compared to the growth factors that have been applied in the model is very small. For 2020 and 2023, the analysis suggests an average variance in traffic growth rates of 0.2%. Even in a 2033 scenario, involving the larger FTE jobs total associated with the full outline consent at Parc Cybi, the manually adjusted traffic growth factors only vary by 0.9% compared to those used in the model. Therefore, based on this analysis, it is considered that the traffic associated with committed developments included in the model has been represented accurately.

Instead, in order to ensure that the correct quantum of development has been applied for Parc Cybi in each reference case and to avoid potential double counting; the three scenarios summarised above have been derived based on realistic assumptions. This accurately reflects the phasing associated with Parc Cybi, based on publicly available information relating to those development cells that have been brought forward to market, associated with a full planning permission, that could be developed alongside the development of a Logistics Centre at Parc Cybi. The following sections provides a brief overview of the

each committed development included in the model and a justification for not requiring manual growth factor alternations to be made.

4.5.2 Land and Lakes (Penrhos).

Penhros at Land and Lakes represents a proposed leisure development, comprising of the construction of a number of holiday lodges. A Transport Assessment has provided information on the level daily trip generation associated with visitors checking in and checking out as well as daily leisure trips associated with visitors during their stay. These totals have been taken forward and applied in the model; with specific assumptions relating to the distribution and phasing provided in the Strategic Model Assumptions Report.

The Transport Assessment provided no information in relation to likely staff numbers required to operate the proposed Penrhos leisure development. Therefore, given the lack of information and likely low numbers of staff involved and seasonality of activity, no specific adjustment has been made in TEMPro to account for this development and the visitor/leisure impacts have been captured explicitly.

4.5.3 Llangefni Link Road.

The Transport Assessment and resulting traffic numbers included in the Strategic Traffic Model are solely in relation to activities associated with the construction of the link road. The specific staff and HGV volumes associated with the construction activities have been included in the model, with specific assumptions identified in the Strategic Traffic Model Assumptions Report. TEMPro adjustments in relation to this development were not considered necessary due to the temporary nature of the construction period and the nature of the development not being covered by TEMPro.

4.5.4 Anglesey Eco Park.

The majority of the impacts in the Transport Assessment concerning the Eco Park relate to the construction of the facility, in terms of construction staff numbers and HGV trips. The Transport Assessment states operational staff numbers will total 100, split between a small ancillary supporting offices for the energy plant (60) and plant operatives (40). These have been included in the Traffic Model explicitly at the appropriate periods as identified in the Transport Assessment.

TEMPro adjustments in relation to this development were not considered necessary as the nature of the development use (biomass energy plant), although included in the underlying assumptions TEMPro, is heavily diluted amongst a range of other land uses. Additionally, the supporting office use is small.

4.5.5 Rhyd-y-Groes Wind Farm.

TEMPro adjustments in relation to this development were not considered appropriate, as the nature of the development use is not covered by TEMPro and the construction impacts are considered temporary.

Additionally, the operation of the facility would involve little to no staff movements that require consideration in the Strategic Traffic Model. The documents available for this development provide construction and staff volumes, which have been included explicitly in the Traffic Model, with specific assumptions summarised in the Strategic Traffic Model Assumptions Report.

4.5.6 Llanfaethlu Primary School.

The new school located in Llanfaethlu will accommodate up to 150 pupils and 16 staff from local schools across Anglesey. Based on information from the Traffic Assessment it has been possible to establish origin-destination movements with appropriate timings. This information has been included explicitly in the Traffic Model and given that this facility is expected to replace a number of existing facilities in the area; no adjustments in TEMPro were considered necessary.

4.5.7 Existing Power Station decommissioning.

The Existing Power Station was operational in 2014 and 2015, when the traffic count surveys underpinning the Traffic Model were commissioned. Traffic movements associated with operational staff of the Existing Power Station are therefore already captured within the base data included in the model.

Based on the standard operating and contracting staff numbers (the traffic impacts of which are already captured in the traffic count data), Jacobs has applied an appropriate change of staff numbers to each year relative to the proposed number of decommissioning and contractor staff.

4.5.8 Committed development summary

The model has been updated with the data available and included within the relevant planning documents that have been sourced. The specific assumptions applied to allow committed developments to be fully captured in the Traffic Model are provided in the Strategic Traffic Model Assumptions Report.

It should be noted that the committed developments included in the Traffic Model reflect those that have been identified as having a valid planning consent within the study area, which have the potential to affect future traffic flows. Reasonably Foreseeable Future Projects or dependant developments, such as North Wales Connection Project (National Grid) and Wylfa Newydd Potable Water Supply (Welsh Water), have not been included in the model due to a lack of sufficient data being available at the time of assessment. However, Volume I- Cumulative Effects I5 – Inter-project cumulative effects (Application Reference Number: 6.9.5) and App C2-4 (Application Reference Number: 6.3.14) have assessed the cumulative effects of these developments appropriately. .

4.6 Wylfa Newydd Project-Related Inputs

The model underwent a further revision to Full Model Rev1 of its inputs after the Wylfa Newydd Project optimisation to ensure it was accurately capturing the most up-to-date input information. These include the following:

- A5025 On-line and Off-line Highway Improvements construction traffic;
- Associated Development construction also including the user effect during its operation, capturing servicing/ deliveries and visitors to the following:
    - Site Campus;
    - Park and Ride; and
    - Logistics Centre;
- Off-Site Power Station Facilities construction also including the user effect during their operation, capturing servicing/ deliveries and visitors to the following:
    - a combined AECC/ESL and MEEG facility;
- Main Construction activity – including all construction staff routing to/from the main site from various origins and locations as well as the HGV/LGV traffic associated with construction activities:
    - pre-Logistics Centre (HGVs);
    - Logistics Centre movements;
    - direct buses to WNDA development (from various locations and accommodation types, including Site Campus);
    - north and east buses (from various accommodation types);
    - direct private vehicles to the Wylfa Newydd Development Area;
    - Park and Ride bus shuttling; and

    - Park and Ride cars;
- Weekend effect, further explained in Section 4.10, including the weekend effect movements from these zones:
    - Site Campus;
    - north and east (existing accommodation);
    - Mainland Zone 1 (existing accommodation);
    - Rest of Anglesey (existing accommodation); and
    - Holyhead (existing accommodation);
- additional traffic movements associated with the main site operational phases, including:
    - construction of Radioactive Waste buildings;
    - warehousing traffic;
    - operational staff and visitors;
    - operational HGVs and servicing; and
    - Scheduled Outage staff and HGVs.

Detailed information has been calculated in relation to the level of construction and operation activity for all the elements identified above. This activity profile has been reflected accurately in the model for each input component ensuring that in each year the full cumulative impact associated with any activity occurring at any given time during the construction and operation periods (and any crossover) is fully captured in the model.

The specific assumptions that have been applied to generate model input data associated with the various components of the Wylfa Newydd Project are summarised in the Strategic Traffic Model Assumptions Report.

The Project input data that have been derived for the model represents 'headline' input values for each model component. These data are disaggregated according to the following key parameters (further detail is provided in the Strategic Traffic Model Assumptions Report):

- on and off-peak values;
- by quarter; and
- by time period (i.e. Monday to Wednesday, Thursday, Friday, Saturday or Sunday).

Further information in relation to these key input parameters is provided in Section 5.0 of this report.

4.7 Worker Origin Data

Typically, accommodation type and location require alternative staff distribution and routing assumptions to be applied. The majority of these distribution and routing assumptions have been derived from a Gravity Model developed by Jacobs' socio-economics team.

A refinement to the model has been necessary to ensure that staff origins and destinations are more accurately modelled for each area/specific input along with the appropriately identified route, by using the revised worker distribution (by ward) from the latest version of the socio-economics Gravity Model.

Bespoke distribution proportions have been generated using wards included in specific areas of Anglesey, such as 'North and East', 'Rest of Anglesey', and the wider mainland areas, such as 'Mainland Zone 1', which have been defined in the Daily Commuting Zone using demographic and bed space/availability from the Gravity Model. This has been required to ensure that input proportions are

correctly weighted for each area. These locations are shown below in Figure 4.3. The specific assumptions applied across each area to reflect App C2-4 Appendix F (Application Reference Number: 6.3.20) are provided in Appendix A of this report.

These areas define the Daily Commuting Zone. The Daily Commuting Zone represents an area up to approximately 50km from the Wylfa Newydd Development Area. In addition to those areas referenced above and highlighted in Figure 4.3, 'Mainland Zone 2' is also included in the Daily Commuting Zone, as an origin for the Wylfa Newydd Project construction workers. Mainland Zone 2 defines the area beyond Mainland Zone 1; thereby representing a large number of separate locations on the mainland. This area captures the small number of workers commuting from the wider 90-minute Daily Commuting Zone. The travel demand generated by these workers is included in the model.

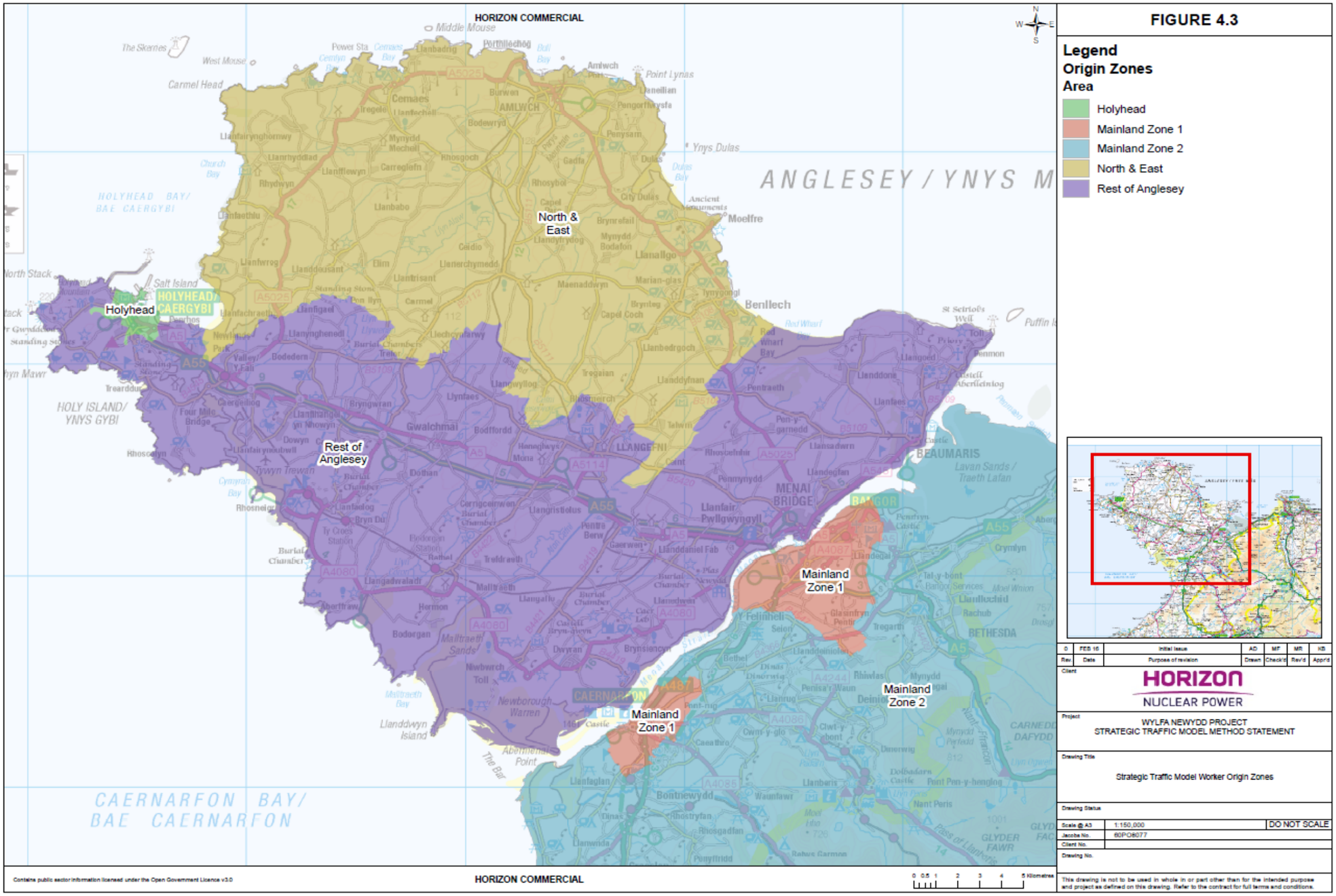
Additionally, a number of alternative inputs and assumptions are required to reflect different accommodation types located within each geographical area. Alternative distribution profiles have been calculated using the Gravity Model, depending on location and accommodation type that also needs to be disaggregated within the model with the appropriate routing and distribution profiles applied. The following main accommodation types are identified below:

- home-based housing (i.e. those already residing on Anglesey);
- existing accommodation (i.e. rented housing availability or alternative accommodation types – such as caravans) for temporary use; and
- Site Campus (specific housing hub designed for construction workers).

Each accommodation type, depending on area, would have alternative routing distributions associated with it and be aligned with alternative vehicle types depending on location (i.e. direct buses to site from the Site Campus or use of the Park and Ride for home-based housing in the Rest of Anglesey area).

A full breakdown of the assumptions applied to each input category by accommodation type and location is specified in the supplementary Strategic Traffic Model Assumptions Report, which should be read in conjunction with this Strategic Traffic Model Method Statement report.

Figure 4.3: Worker origin locations



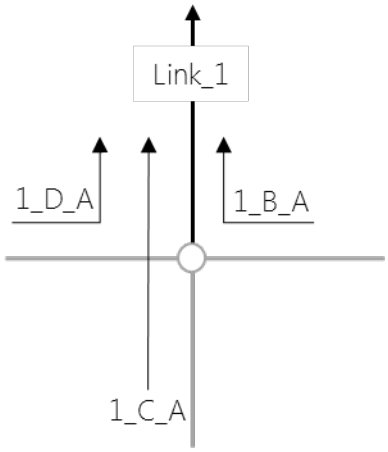
4.8 Model Routings

In order to assign traffic to the modelled network, a specific route is defined for a particular traffic input component. Each traffic input therefore requires a route to be identified, for the model to capture the flows associated with a particular input at each relevant location. These 'routes' are built up using the turning movements at each junction located along a route that traffic would be required to pass through to navigate the full route.

Each output sheet within an element workbook includes every turning movement possible within the model for which surveyed data has been included. This includes a list of all possible origin and destination combinations and provides a hard coded route of all the individual turning movements at the junctions necessary to complete a route.

For example, a northbound route originating in Valley to Amlwch would be initiated by combining all movements travelling north on the A5025 from Valley. If the A5025 and A5 crossroads junction in Valley represents junction 1 in the model and, arm A is the A5025 north, arm B is the A5 east, arm D is the A5 west and arm C is the B4545 south, the link flow on Link_1 the A5025 north of Valley would be made up from the following specific turning movements (i.e. 1_B_A, 1_C_A, and 1_D_A). This is demonstrated in Figure 4.4. The benefit of this approach is that traffic is accurately represented both in terms of a link flow but also as a turning movement at the various different locations within the model network that a vehicle would be expected to impact on a specified route.

Figure 4.4: Link ID Calculations



The next junction to the north that is included in the model would then follow the same process, allowing any traffic (base or Project-related) that might be generated from the minor arms to be captured on the next northbound link and so on. This ensures that traffic flows are accurately accrued or removed from the network along a route based on specific turning movements.

The pre-set routes for each model input can be specified in a drop down menu in the model platform. When a route has been specified, the corresponding number of vehicles that have been specified as inputs for a particular element are assigned to the particular turning movements that make up a route, in the correct proportion for that route as defined in the model platform. This process would be repeated until all movements were covered for that specific element (and identified route), and the output sheets included all related vehicle flows. By using the unique turning movement identifiers described previously, this process ensures that the model can accurately look up the correct survey flow for each junction movement within the survey master flow sheet summarised in Section 4.1.4 and include any Project-related activity for all specified inputs additionally.

Assignment of inputs onto routes have typically been split into segments based on likely travel time between a specific origin and destination. The model has been developed to consider routes and traffic in 30-minute segments. Splitting routes into individual 30-minute segments ensures traffic associated with a particular input

component involving a journey greater than 30-minutes has traffic assigned to the correct location at the correct time on the network, thereby avoiding any double-counting. The specific assumptions that have been applied to ensure a 30-minute time segment has been consistently applied across all inputs are provided in the Strategic Traffic Model Assumptions Report.

Once a route has been identified for a particular component, the gravity model outputs have been used to define appropriate proportions. These proportions have been disaggregated by origin or destination and then further aggregated over a day (by 30-minute time period).

A key function in the model is therefore to apply the correct headline input figure to the correct route/turning movements by the correct proportion by time of day.

To ensure the Traffic Model has enough detail to cover all the new inputs and the various origin and destinations, there are around 1,500 individual routings, all coded according to every turning movement representing that route. This reflects the scope of the model in terms of network extents, input data and the variety of origin-destination combinations that are available.

4.9 Bypass Methodology

The model has been structured to reflect accurately the actual absolute traffic variations between the new bypass and existing A5025 links, when the A5025 Highway Improvements are introduced.

Rather than implement alternative model structures with separate and alternative link coding to represent the 'with' and 'without' bypasses, the model has been developed to implement dynamically the bypass effect if selected by the user when initiating a model run. This process has been based on traffic turning counts, using the data captured from the MCTCs, from a number of different junctions that feed into the existing and new bypass links.

The most up-to-date methodology applied used the actual turning movements at various junctions that feed into the existing and proposed A5025 bypass links to calculate the actual total flow that would be expected to occur on the respective links. In each case, this method applies the same functions to the forecast traffic associated with all inputs in a given scenario; thereby ensuring accurate absolute numbers reflect the specific scenario in question.

As each of the four Off-line Highway Improvements are subtly different, an individual mini reassignment model has been developed for each to ensure that the reassignment effect at each location is as accurate as possible. The bespoke changes applied to each Off-line Highway Improvements are specified below. It should be noted that the bypass methodology has only been applied to the four proposed off-line sections. On-line Highway Improvements relate to more minor works that would not actually result in any traffic reassignment.

4.9.1 Valley roundabout bypass

It is proposed that the existing road directly north of the Valley Crossroads on the A2025 would be stopped up and replaced with the northern arm of a new roundabout. Therefore, all traffic that would use the existing road would be re-routed to the new road when the bypasses are selected in a model run. Any traffic using the A5 between Valley and A55 Junction 3 has also been transferred onto the new arms of the roundabout. This has been represented as a simple replacement calculation within the model, when bypasses are selected in a model run.

4.9.2 Llanfachraeth bypass

The proposed bypass flow at Llanfachraeth has been calculated using the turning counts from a number of different junctions that feed into the existing and new bypass links at both sides of the bypass. Any traffic which would be expected to turn onto or off the existing network in the area being bypassed has been applied onto the existing network in the direction of travel, with all other traffic assumed to use the bypass (i.e. through-traffic). This provides accurate numbers of vehicles that would be expected to enter and exit both the existing and new roads at the points they connect with, should the bypasses be selected in a model run.

Due to the length of this section of bypass, there are up to three internal road junctions on the A5025 through Llanfachraeth. Analysis has highlighted that this mini-road network actually creates some loss over modelled hours (i.e. some vehicles either stop within the settlement, or turn off between junctions and particular turning movements). This results in an exact match between calculated values at either end of the bypass being unachievable. Analysis has highlighted that the rate of loss is very low and therefore the methodology applied is considered appropriate.

4.9.3 Llanfaethlu bypass

The Llanfaethlu bypass has been designed to replace the current A5025 with a straightened section of road. Therefore, all traffic currently routing along the existing road would instead be reassigned along the new highway improvements, when bypasses are selected in a model run. By applying this straightening onto the network, there would be new junctions required to access other parts of the network reflecting movements that are not currently possible. These new junctions include all current traffic that would route through the existing junctions.

4.9.4 Cefn Coch bypass

This follows the same methodology as that applied for the Llanfachraeth bypass and has been based on the turning movements established from MCTCs from a number of different junctions that feed into the existing and new bypass links at both sides of the bypass. The modelling of any traffic, which is expected to turn onto or off the existing network in the area being bypassed, is applied onto the existing network in their direction of travel, with all other traffic assumed to use the bypass (i.e. through-traffic).

By adopting a methodology that utilises the actual traffic turning manoeuvres on the existing routes, any bypass reassignment is accurately represented in any scenario as the values simply change in line with the altered traffic flows. This provides added stability and accuracy between scenarios compared to the proportional approach used previously, which provided a degree of variability.

It should be noted that when initiating a model run, the user must define whether that model run is undertaken with or without bypasses. This selection is then applied to all inputs specified within that particular model run. This is carried out on the Model Manager sheet within the Sheet Manager workbook prior to any run.

4.10 Weekend Effect

The structure and flexibility of the model has been developed specifically to be able to accommodate nuances of the Wylfa Newydd Project activity such as the weekend effect. The following broad assumptions have been implemented to reflect accurately the weekend effect in line with updated information received:

- The weekend effect takes place on a Thursday evening and a Sunday evening to allow a full three days off (i.e. 11/14 working pattern);
- updated input data to reflect the staff/worker numbers associated with the Site Campus and relevant accommodation type in other locations, to demonstrate the impact of the weekend effect, as provided in revised timelines/input data by Horizon; and
- as approximately 50% of staff are able to travel to their place of origin for the weekend effect, the model has sufficient granularity to demonstrate the appropriate reduction in staff trips travelling to the site for the residual working operation including those staff remaining on-site and not off for the weekend on a Friday and Saturday. Previously this had been over-estimated.

In order to achieve an appropriate breakdown that fully captures the weekend effect, it has been necessary to develop the structure of the model to allow for a greater level of detail to be specified in terms of inputs (and therefore outputs that can be specified). This has resulted in the following time periods being explicitly included in the model (with each requiring specific input data for all input components):

- Monday to Wednesday;
- Thursday;

- Friday;
- Saturday; and
- Sunday.

This allows the model to produce outputs for each time period individually, if required, but also use multiples and combinations of each to create the AADT and AAWT outputs required. In order to generate AADT and AAWT outputs, these time periods have been generated using multiples of specific survey data inputs and Wylfa Newydd Project-related inputs to ensure that there is consistency between the application of data. For example, the original survey data used to furnish the model has been undertaken on a Thursday and Saturday, therefore the Monday to Wednesday time period has been generated by using three multiples of Thursday traffic count data whilst a Friday simply reflects a Thursday dataset. The Project-related traffic inputs have been generated to align exactly with these time periods, allowing multiples and combinations of each to be applied alongside base data.

This structure provides added functionality with the model able to provide average week outputs or specific outputs for each time period. For example, alternative input values can be specified for a Thursday and a Sunday specifically to reflect the weekend effect that only occurs during these times. Additionally, a Friday and Saturday activity can also be specified separately to reflect the lower residual workforce that are then at work. This ensures that the traffic figures relating to each time period accurately reflect the actual activity forecast in that time period, ensuring more accurate AADT and AAWT calculations and hourly outputs within each time period.

5. Modelling Methodology

5.1 Modelling Process

5.1.1 Implementation of quarterly approach

Previously, the model had operated under a simple 'peak and off-peak' methodology, whereby six weeks of the year were assumed to represent peak traffic (i.e. August survey data) and 46 weeks were assumed to represent off-peak traffic (based on November surveyed data). As the Wylfa Newydd Project has evolved and more detail was provided by Horizon in respect of construction activity across different components, it became apparent that the previous 6/46 peak/off-peak model structure was not adaptable or detailed enough to accurately capture changes in construction activity over time.

It has therefore been necessary to update the model to adopt a quarterly approach to provide further disaggregation of input data by year. In this regard, each year has been broken down into four quarters of 13 weeks. This is necessary to capture variation within a year that is evident in the construction profile of different inputs as well as capturing more specifically when particular elements start and end. As part of the input, the specific number of weeks that an activity occurs for within a quarter has been calculated and can then be specified in the model. Quarters have also been further disaggregated to allow for a peak and off-peak value to be specified for each input. This allows the flexibility to capture the change in traffic/activity and capture the variation in peaks over the full construction period. The process that has been employed to generate the peak and off-peak values for each Wylfa Newydd Project component is summarised in the Strategic Traffic Model Assumptions Report. The four quarters are defined as follows:

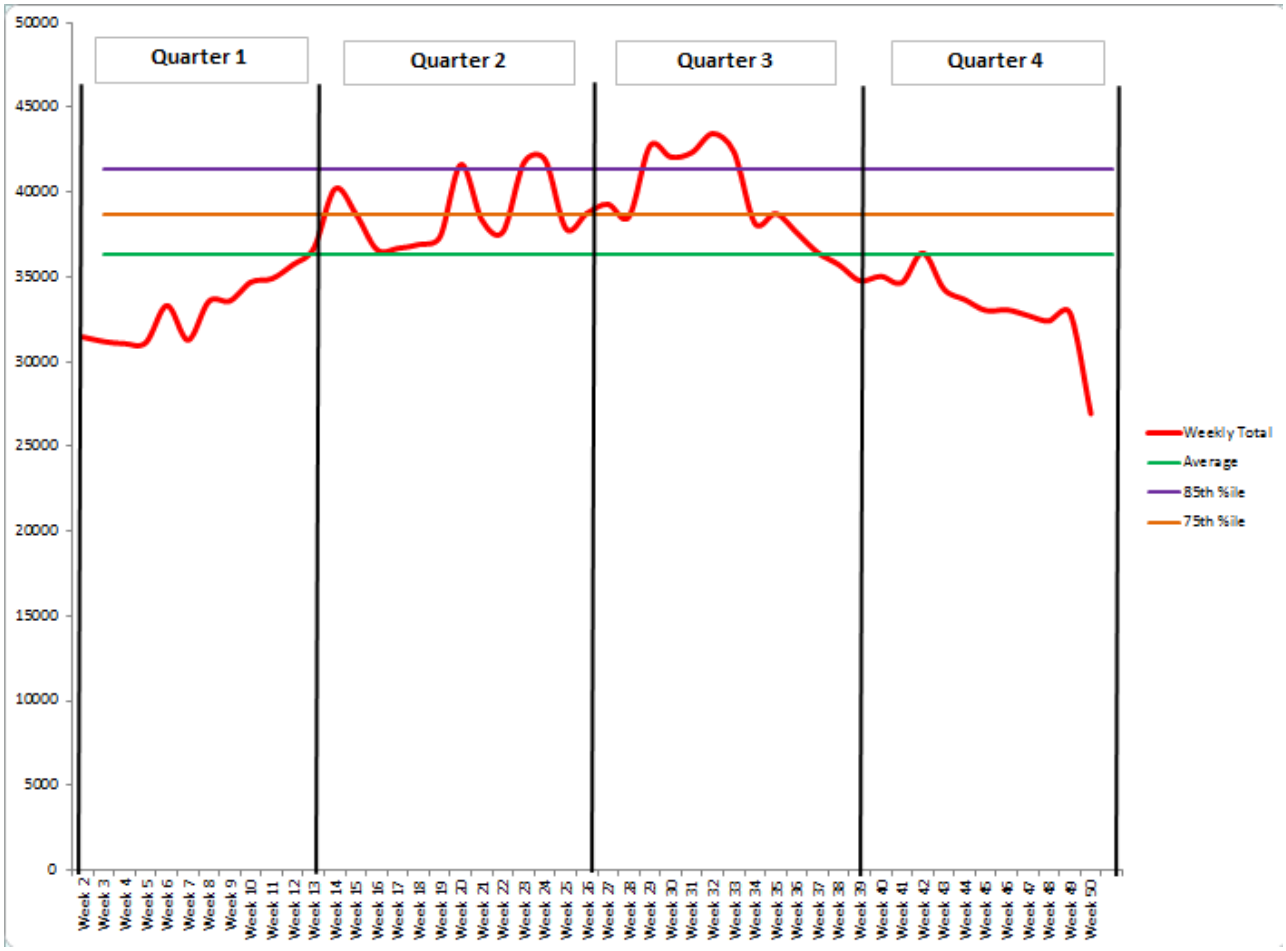
- quarter 1 represents January, February and March;
- quarter 2 represents April, May and June;
- quarter 3 represents July, August and September; and
- quarter 4 represents October, November and December.

Profiling of vehicle numbers for each component input has been undertaken to generate the appropriate peak and off-peak vehicle input values to include in the model. This process has been undertaken for all vehicle types for all model inputs. Using numerical formula rules, data have been aggregated on a month-by-month basis based on activity. This has defined what value, in terms of vehicular input numbers, is associated as 'peak' and 'off-peak.' Generally, peak values have been defined based on an appropriate rule (i.e. 85th percentile of traffic volume by input), which has been specified depending on the nature and profile of activity for each input. The Strategic Traffic Model Assumptions report provides additional detail on how the specific input values and peak/off-peak profiling has been undertaken.

The relevant number of peak and off-peak weeks by month during the construction period of each component has been defined through this process, with the appropriate input value specified within the model within each quarter for the relevant years of activity.

This quarterly approach and peak/off-peak functionality is consistency applied across both Wylfa Newydd Project-related data (described further in the Strategic Traffic Model Assumptions Report) and in the survey flows. Figure 5.1 below provides the basis on which the peak and off-peak rationale has been applied to survey data. This is based on the yearly profile of 2014 traffic volume recorded at the ATC site on the A5025 at Llanfachraeth.

Figure 5.1: Survey data profiling



Based on the percentile analysis captured on the graph, it is considered that the 75th percentile best represents the split of traffic volume on a peak and off-peak profile over a year. Based on this analysis, Table 5.1 below summarises the number of peak and off-peak weeks that have been applied in the model to generate AAWT or AADT outputs.

Table 5.1: Survey data profiling (peak and off-peak)

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
Peak	0	6	7	0	13
Off-peak	13	7	6	13	39

This highlights that the off-peak calculated traffic conditions (i.e. < 0.75 percentile) would represent the prevailing traffic conditions for 39 weeks of the year, most typical of quarters 1 and 4. Conversely, peak calculated traffic conditions (i.e. > 0.75 percentile) would represent the prevailing traffic conditions for 13 weeks of the year most typical in quarters 2 and 3 during the summer months. This approach therefore allows for the seasonality and variation in a year to be appropriately captured within the AADT and AAWT outputs provided by the model. For example, Quarter 3 is made up of 7 multiples of August 'peak' data and 6 multiples of November 'off peak' data. The development of percentile based peak and off peak input values for all Wylfa Newydd Project activity has been generated to ensure complete consistency with the model structure and ensure AADT and AAWT outputs apply the correctly weighted base and Project-related traffic inputs across a year.

Although the base data profile remains consistent across each reference case year (although uplifted by the appropriate growth factor); the method allows the variability of each Project-related element across the construction programme to be accurately captured.

Therefore, by including the correct multiples of peak and off peak data across each year for base flows and Project-related inputs; the AADT and AAWT outputs are accurate as well as the outputs for specific time periods. For example, Q3 of 2023 has been identified as peak of construction and therefore the specific outputs for Q3 in 2023 will capture the appropriate volume of peak activity related to this period.

The model, using the updated VBA platform, then takes the data for the base year flows and each Wylfa Newydd Project-related input as disaggregated by the quarterly structure described above and follows the same consistent process for calculating the various outputs.

5.1.2 Model Process

Figure 5.2 provides a visual illustration of the full model process, from the initiation of a model run and computation of the various inputs for a given scenario to the production of the outputs.

It should be noted that the Traffic Model has been developed specifically for the purpose of assessment the bespoke nature of the Wylfa Newydd Project, and therefore represents a complex process that has evolved to accommodate a number of changes as the Project has evolved. It is also noteworthy that the Traffic Model is required to perform a number of functions, not least that it is able to provide a wide range of outputs for different end users as well as being structured appropriately to accurately reflect Project specific nuances – such as the weekend effect and varying activity over time. This dictates the need to implement a quarterly approach that allows specific data for each project element by different days and times to be specified.

The diagram below therefore aims at providing a simple but detailed overview of the model process being mindful of the bespoke and complex nature of the Strategic Traffic Model.

Figure 5.2: Model Methodology Flow Chart

Select Calculate
This Macro links to a range of other VBA macros which ultimately run the entire model process, based on the selections highlighted in 'Sheet Manager'.

Selection of Growthed Trips and Scenario Year
During the Input Selection process, the Growthed Trips input needs to be selected (turned blue). Growthed trips represent the baseline traffic flows in the model, on which development related activity is assessed. The Growthed Trips data are based on 2016 traffic flows, and when selected are included in the modelling process.

Survey Calculation.
This macro takes the surveyed flows included in the Model (weekend and weekday for August and November) and multiples them by the correct growth factors included in the model for the specified year. Traffic data are growthed using an array of appropriate local growth factors derived for Anglesey, for the time periods outlined in Section 4.4.

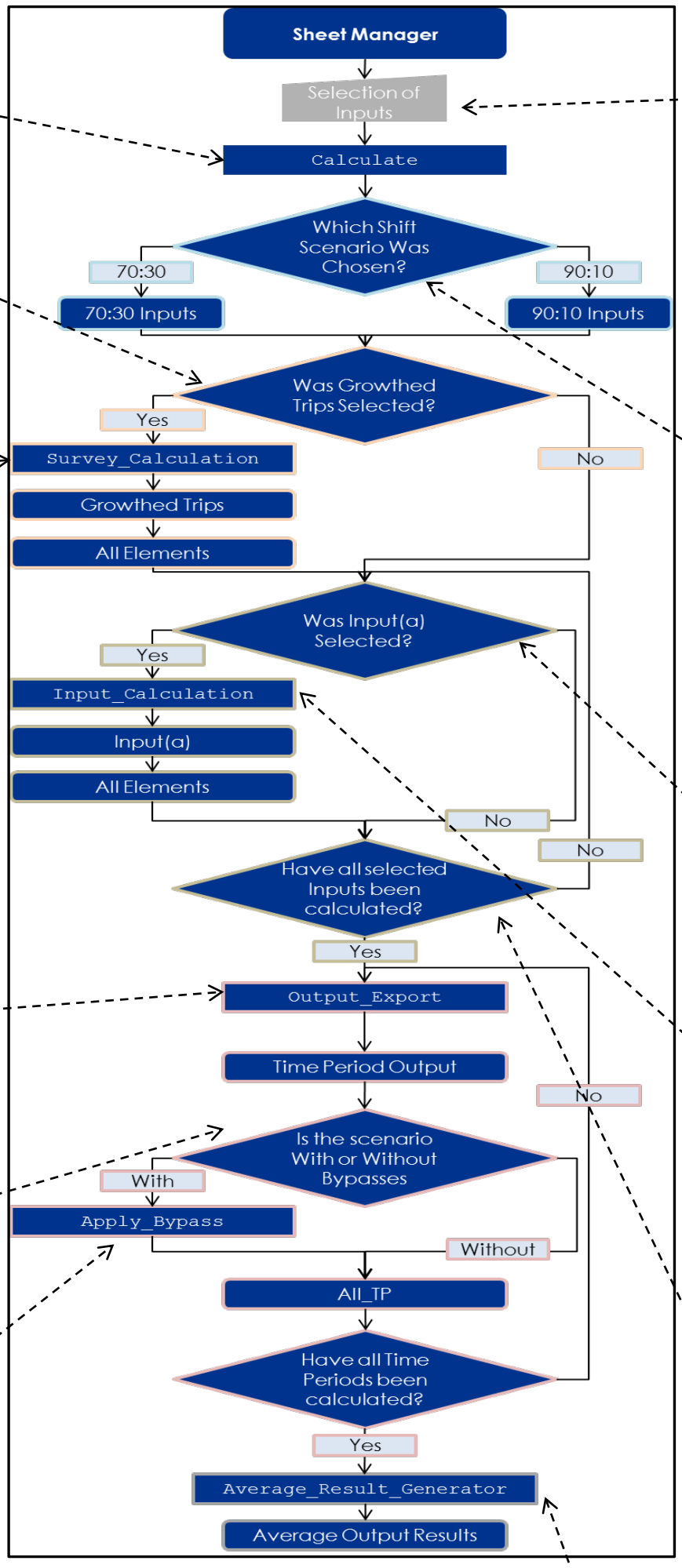
Output_Export
This macro uses the values calculated from the model inputs and combines them to produce a complete set of relevant traffic for Mon-Wed, Thursday, Friday, Saturday and Sunday time periods.

Is the Scenario With or Without Bypasses?
If during the Input Selection process 'With Bypasses' was selected, the model will run *Apply_Bypass*, if not, this process is skipped. The application of bypass traffic reassignment is an additional process that lengthens the model run-time, if selected.

Apply_Bypass
This Macro uses the turning movement substitutions stored in the Bypass Manager sheet to demonstrates the effect of the bypasses by reassigning the traffic from turning movements to newly assigned locations routes on the network.

The bypass manager identifies all the turning movements that would change as a result of the bypasses coming into effect. The altered movements associated with the bypasses are therefore combined from a variety of existing turning movements to be added on, subtracted off, or a combination of both. This demonstrates the effect of the bypasses by reassigning the traffic from turning movements to newly assigned locations or routes on the network.

Have all Time Periods been calculated?
The model cycles through every Time Period to undertake the process described above, until all Time Periods have been calculated.



Selection of Inputs
This is a manual process which **MUST** be completed by the user prior to any model runs being started.
The following selections are required:

- Choosing which Inputs are required.
- Selecting Scenario Year (2015 to 2035).
- Selecting Shift Scenario to apply (70-30 or 90-10).
- Selecting Bypass Scenario (with or without A5025 bypasses).
- Naming Output Folder (this will be created for Model run outputs).
- Select CALCULATE to begin a model run.

Which Shift Scenario Was Chosen?
Previous versions of the model required the ability to analyse different shift scenarios. As the Project has evolved the singular scenario of 70:30 has been agreed.

Whilst this functionality has been retained, the current Full Model Rev1 only functions on the 70:30 setting.

Input Selections Calculation
This process identifies every input that has been selected (turned blue). If an input has been selected, this is then opened and the model completes the *Input Calculation* macro for the specified inputs. The number of inputs selected therefore directly impacts on the run-time of the model.

Input Calculation
This macro uses the headline traffic figures provided within each component input sheet that has been selected. This information is provided in the Vehicle Profile tabs for each input. The routes that this traffic is assigned to, and the appropriate time periods, are defined in the 'Routings' tabs of the input spreadsheets. The *Input Calculation* then assigns the calculated traffic volumes across a range of given routes by time period.
This process is undertaken for each selected input and these values are then combined across all selected components by time period.

Have all selected Inputs been calculated?
The model cycles through every input and if it is switched on will carry out the *Input Calculation* process until all sheets have either been skipped or calculated, the model moves on to the next process.

Average_Result_Generator
This process takes all the values calculated in Output_Export function and provides a standalone interface to provide various outputs, at the request of the user.

The raw data copied from the model run are included in various hidden sheets and the 'Link ID Generator' tab can be used to provide (and export) an array of different time period outputs for the related scenario that the data corresponds to.

5.2 Scenario Input Selection

The model has the capability of providing a full 'switch on/switch off' function for each Wylfa Newydd Project input element and associated assessment years. This provides the flexibility to accurately assess the specific activity and input components that require inclusion in specific assessment scenarios for a specific year. An example of this is provided in Figure 5.3, so for example, the 'outage' input would only be required for operational assessments and could be de-selected for a Wylfa Newydd Project construction only scenario. Providing this level of granularity at the input selection stage then allows for individual model runs to be initiated for any combination of inputs, which are all fed through the VBA platform, consistently applying the model calculations to each input, upon initiating a model run.

Figure 5.3: Example of input selection

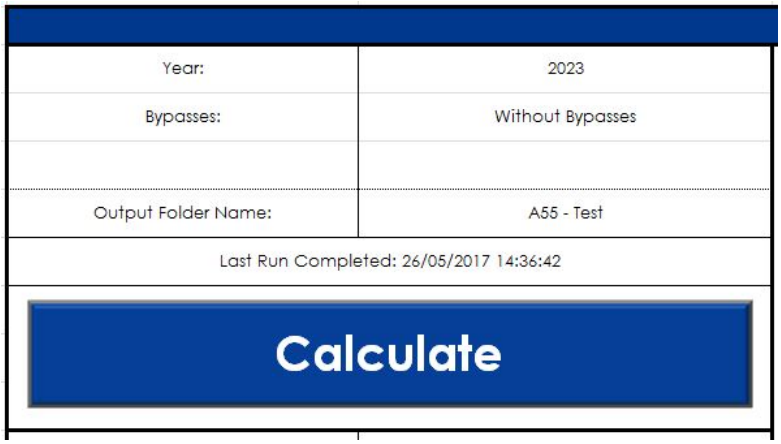
Op Traffic	All Components	Normal Staff	Shift Workers	Security	HGVs	Visitors	A55
Outage	All Components	Staff	HGVs	#3	#4	#5	A55
Rad Waste	All Components	Cons Staff	Cons HGVs	Cons LGVs	Visitors	#5	A55
Warehouses	All Components	LGVs (P)	LGVs (OP)	#3	#4	#5	A55
Op #5	All Components	#1	#2	#3	#4	#5	A55

An entirely separate interface has been created to allow maximum flexibility and control to the user of the model. This has been compiled into an individual spreadsheet 'Sheet Manager'. Within this, there are the following functions, which require a selection to be confirmed:

- Scenario year;
- Bypass Selection (With or Without);
- Day/Night Shift Split (70:30); and
- Specify Output Folder Name.

This interface can be seen in Figure 5.4.

Figure 5.4: Full model user interface



Specific elements have been subdivided into different input categories due to the complex variations in routings and shift times. For example, prior to the operation of the Logistics Centre, HGV movements would be assigned to travel directly to site. Upon construction of the Logistics Centre, HGVs would be assigned to travel to the Logistics Centre. This window is also amended when the bypasses are completed beginning at the end of 2020.

Lastly, when the Logistics Centre ceases operation, the vehicle movements then route directly to site using the 12-hour window.

Because the inputs and the specific assumptions related to each are static in the model (i.e. headline input numbers and routing classification), any variation in input parameters related to the same component at different times require separate inputs to be individually specified (such as the HGVs and Logistics Centre example referenced above).

5.3 Outputs

5.3.1 Model generated outputs

As identified in Section 5.1, the implementation of a quarterly model structure that is furnished with 'peak' and 'off peak' survey and Project-related inputs allows for a large variety of outputs to be provided. Due to the variety of time periods and inputs that are defined in the model, the range of outputs also reflects this level of intricacy. A standalone interface has been created called 'Average Output Results'. This operates independently of the other components of the model and can allow users to generate and review the specific outputs required.

All of the outputs from each element included in a model run are combined to provide a total number of vehicles for every hour of each turning movement. These are then copied into a standalone 'Average Output Results' spreadsheet where further calculations provide the required outputs in the desired format (e.g. 24-hour AADT).

A screenshot of this interface can be seen in Figure 5.5. Each grey/blue cell represents a detail/output that can be specified, representing a tool that can provide a range of bespoke outputs by road, time period and hour. This identifies a separate selection available for AADT and AAWT outputs on the left hand side of the screen which are built up using the correct multiples of the individual time periods specified in the model as well as peak or off peak data.

Additionally, a separate selection tool is provided for the production of hourly turning flow or link flow data at all junctions / locations included in the model. Because each year (2016 to 2035) included in the model has the same structure and level of granularity applied (i.e. quarterly approach and peak/off peak values); the array of hourly outputs can be selected by:

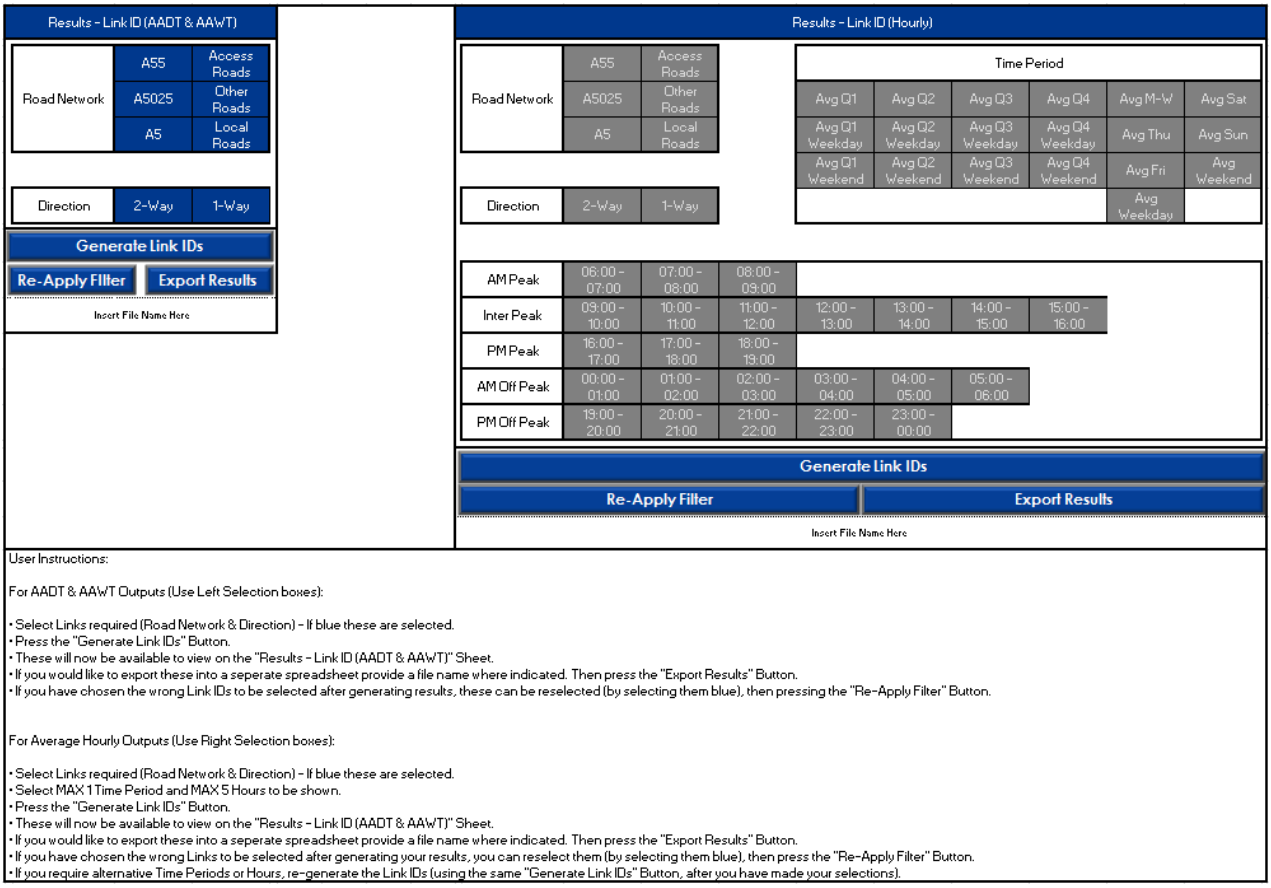
- Road type;
- Direction;
- Hour of day;
- Time of year.

The time of year selection provides a number of options to provide hourly flows for specific time periods; depending on the needs of the user. Average results can be provided by Quarter, made up of the appropriate multiples of peak and off peak data processed within the model. Alternatively, outputs can be selected by day of the week to ensure elements such as the weekend effect are captured.

For the purpose of providing worst case hourly traffic flow outputs, the average Thursday values for Q3 of 2023 would be considered the worst case and could be selected if required by the end user. These outputs would represent the appropriate multiples of peak data (base and Project-related) whilst also accounting for other nuances of the Wylfa Newydd Project such as the weekend effect on a Thursday.

The output interface is therefore provided to allow maximum flexibility to allow the specific outputs required by individual users to be chosen for any given assessment year for which a model run has been completed. The specific assessment years and scenarios that the Strategic Model has been used to generate are summarised in Section 7, from which the full range of outputs identified above can be provided.

Figure 5.5: Average output results user interface



The model provides outputs for the following:

- 24-hour AADT – these flows have been generated from the hourly flows for all 24 hours of each day, for seven days a week.
- 18-hour AAWT – these flows have been generated from the hourly flows for 18 hours of each weekday.

The other outputs available, for all 24 hours of a day, are available for the following scenarios:

- Average flows by quarter:
  - average quarter;
  - average weekday; and
  - a weekend.
- Average flows by day:
  - average Monday to Wednesday;
  - average Thursday;
  - average Friday;
  - average Saturday; and
  - average Sunday.
- Average weekly flows by day:
  - average weekday; and

- average weekend.

The data outputs indicated above are disaggregated into various specific vehicle types and can be specified for the following outputs, with total vehicle numbers used in subsequent assessment as appropriate:

- cars;
- LGVs;
- HGVs;
- PSVs;
- light Vehicles (cars + LGVs); and
- HGVs + PSVs.

The outputs also provide proportions as percentage outputs for the following:

- HGVs;
- PSVs; and
- HGVs + PSVs.

Speed data are provided for each link. These have been based on the posted speed limit, where this information could be identified. For some local or access roads, general assumptions have been applied to all links. Speed data have been provided, including:

- speed (mph);
- speed (kph);
- Speed-Band Category (Interim Advice Note 185/15 - Urban/rural (non-motorway));
- speed range (Interim Advice Note 185/15 - Urban/rural (non-motorway)); and
- Noise Speed-Band (kph).

All the information identified above is provided by road network link. These link flows have been generated to include any turning movements from which traffic would directly flow onto that link; this has been done for all relevant inputs per scenario.

Individual hourly turning movements at individual junctions or links can also be provided if this level of detail is required.

6. Traffic Model Checks and Verification

The Traffic Model represents a bespoke Excel-based traffic modelling tool that has been developed specifically for the purposes of assessing the traffic related impacts associated with the Wylfa Newydd Project. Therefore, it has not been possible to undertake the standard calibration and validation processes that would normally be a requirement of ensuring a transport model is fit for purpose.

Notwithstanding; Jacobs has undertaken comprehensive checks throughout the model development, data input and scenario assessment stages to ensure that there is confidence in the model processes and resulting outputs. The following logic checks have been undertaken as part of the detailed check and review process.

6.1 Survey Data

Jacobs received traffic counts between 2014 and 2017 from Manual Classified Turning Counts (MCTCs) and Automatic Turning Counts (ATCs).

To ensure the data collected was representative of the traffic conditions experienced in the study area in both peak and off-peak periods across the year, counts were taken for a weekday (Thursday) and a weekend (Saturday) for two months; August (traffic is generally highest in August, as it is representative of the tourist season), and November (a month of the year when traffic is operating normally without any seasonal impacts).

When it wasn't possible to have data collected in the same months across every survey year, it was ensured that the data was consistent across all years with surveys undertaken in peak and 'neutral' months that were considered to reflect peak seasonal activity and standard network operation respectively. Standard factoring processes were then undertaken to adjust the data to ensure the surveyed inputs produced stable outputs across the full area of coverage.

This included checks on the logic of the arm layouts, the consistency of the data surveyed and spot checks that the flows were sensible.

6.2 Factoring Adjustment Checks

As described earlier, the Traffic Model has evolved over time and has been populated with traffic count data undertaken in different years and at different times of the year. It was therefore necessary to use a standard approach to all data factoring to ensure commonality across all base data. This included seasonal adjustments converting data that was captured into appropriately weighted neutral November flows and peak August flows, and extending the model range to include all 24-hours of a day (a requirement as the project evolved) suing adjustment factors from a 24-hour ATC site.

This process was undertaken in a step-by-step basis which in turn allowed for a logical checking process.

6.2.1 Reformatting Checks

Spot checks were undertaken that when reformatting the data into the layout required for modelling that all turning movements were correct. This was completed checking a selection of sites that individual hourly turning movements were correct by vehicle type and as a total.

6.2.2 Night-time Factoring Checks

The following checks firstly covered the already surveyed hours to ensure they were correctly located, following this, the previously agreed night-time factors were checked on a site-by-site basis to ensure for every site the correct hourly factors were assigned to each hour. Separate spot check calculations were then completed to ensure that spreadsheet calculations were correct.

6.2.3 Seasonal Adjustment Checks

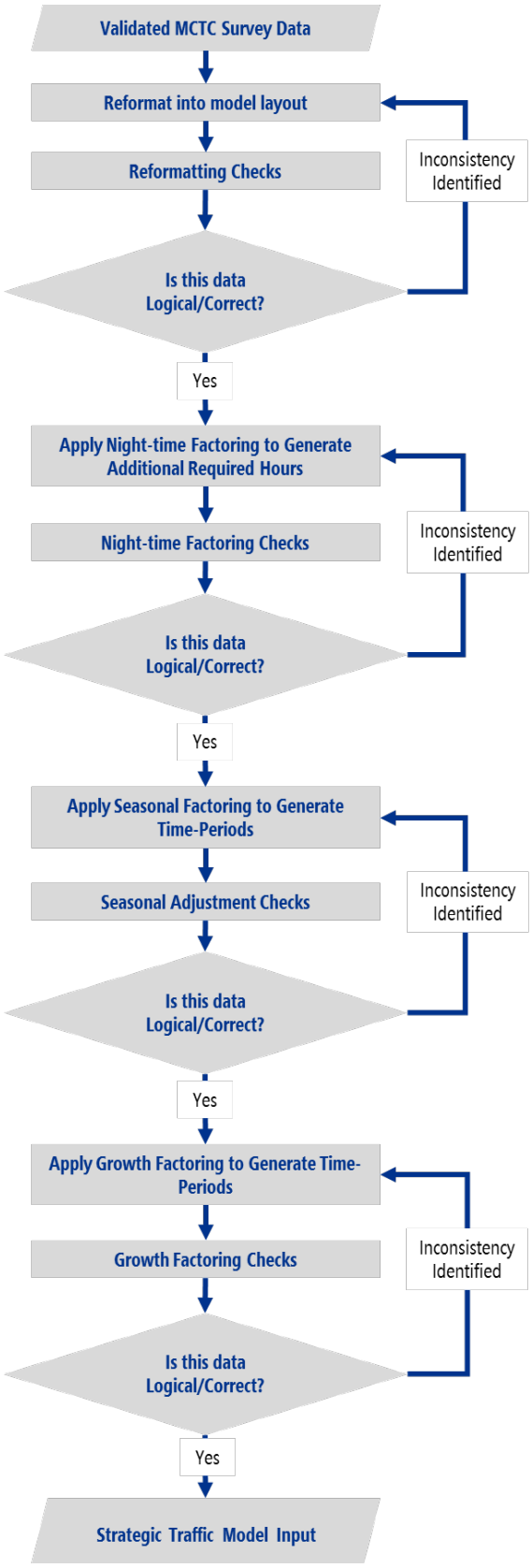
This checking process checked every site was using the correct seasonal adjustment factor and then completed spot check calculations to confirm the spreadsheet was using the correct calculations.

6.2.4 Growth Factoring Checks

This checking process checked every site was using the correct annual growth factor and then completed spot check calculations to confirm the spreadsheet was using the correct calculations.

This process is summarised in Figure 5.1.

Figure 6.1: Factoring Adjustment Checks



6.3 Model Process Checks

Each process of the model was checked in isolation, then as part of the model as a whole to ensure the model operated as expected.

6.3.1 Routing Checks

Each route within the model has been generated manually and as such required intensive checking. This was carried out by the originator of each route, with a second check completed by an independent checker. These were primarily completed in sections relating to specific aspects of the project and as such each area could be checked extensively during each checking process. If any issues were found these were raised by the checker and confirmed with the originator.

In addition to the above initial manual checking process, an automated checking process was created in excel, this was used to check the main corridors of the A55 and A5025. This compared each turning movement to its preceding and proceeding movements to ensure, if the route was part of a defined corridor, its turning movements correctly compared to a pre-confirmed check corridor.

Additionally, the macro testing outlined below provided an opportunity to check a selection of key routes used within the model to provide additional robustness.

6.3.2 Link ID Checks

The model outputs are provided as link flows, these are built up based on the turning movements which would provide traffic onto that specific link. These were again produced manually, checked by the originator, then a second check completed by an independent checker. If any issues were found these were raised by the checker and confirmed with the originator.

Additionally, the macro testing outlined below provided an opportunity to check a selection of key routes used within the model to provide additional robustness.

6.3.3 Bypass Checks

The process of assigning traffic correctly between the original road network and the highway improvements is completed by substituting vehicle flows for all affected turning movements. Each of the substitutions was firstly checked by the originator before undergoing a second check by a senior member of the modelling team. This involved comparing the with and without bypass scenarios to ensure the correct reassignment was seen.

6.4 Macro Testing

To make the modelling process more efficient, the model was developed in sections with each section of macro code split into its own module (e.g. producing final model outputs is in a separate module to applying growth factors to surveyed flows). Alongside this, each macro was developed to firstly work as a standalone automated process, prior to being combined to create the Strategic Traffic Model. This allowed each macro to be tested iteratively until it was providing consistently accurate results, then checked as part of the entire modelling process to ensure it still operated as expected when the model was completed.

When checking the entire modelling process an easily traceable number was placed into the model as a specific input and then a model run initiated. A check was then undertaken to ensure that the correct output values were identified on the correct route, in the correct proportion and at the correct time as specified in the input stage. This was completed for various different scenarios (i.e. multiple inputs, with and without bypasses) to ensure all facets of the modelling process operated correctly.

6.5 Independent Audit Process

To ensure the model was fir for purpose an audit was undertaken by Jacobs staff in the Transport Modelling team in London. This team include staff with a broad range of modelling and Visual Basic (VB) knowledge. These audits were undertaken when both the project and model had evolved to an extent where a fundamental change had occurred. The audits focused on the functionality of the model and not the inputs themselves, the assumption being this was captured in the suite of checks outlined previously.

The audit process undertook an initial meeting to establish what initially the layout and function of the model (as the project evolved this centred around the updates to the model). From this point on the model was handed over to the staff independent to the day to day model development and operation. This ensured an independent team were able to carry out an audit involving a thorough check was carried out on the macro code in the model to flag any errors and provide advice where they felt a process could be made more efficient for example.

Additionally, model runs were carried out to ensure logical outputs were consistently produced by the model.

7. Project Scenario

This section identifies the different scenarios that were requested to support the DCO application. This chapter further elaborates on the text in Section 4.6 which focused more specifically on identifying the full scope and flexibility of the model including the various elements and components included in the model scope representing a combination of base flows, committed developments and Wylfa Newydd Project related traffic. It was from this extensive scope that the full 'switch on / switch off' capability of the model was derived; i.e. being able to model any combination of activity in any year.

This section provides further detail on the specific elements and components that are combined to create a specific scenario. For each scenario that has been run, the full range of outputs can be specified by the user as identified in Section 5.3 of this Method Statement.

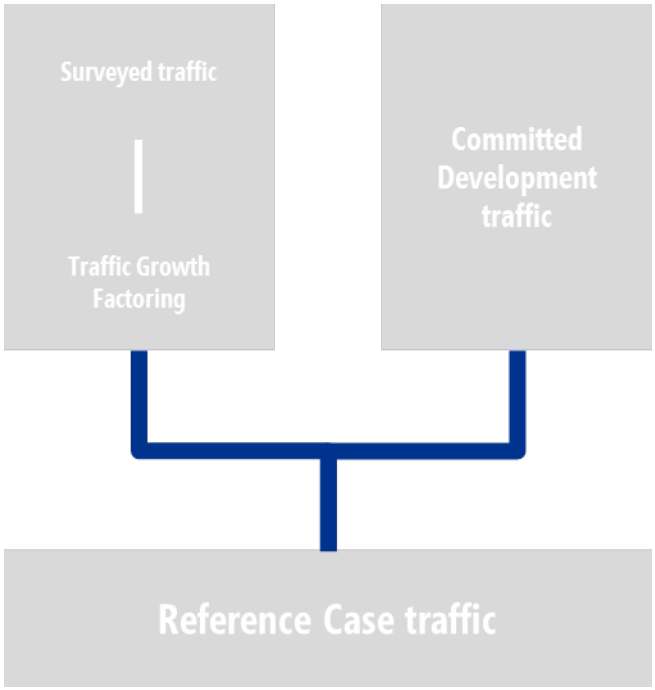
7.1 Baseline and Reference Case

The assessments that have been undertaken using the Strategic Traffic Model have been based on a single design scenario. This assessed traffic conditions during a Reference Case (with Wylfa Newydd Project) model run and a Wylfa Newydd Project (with Project) model run for 2020 (both with and without A5025 Highway Improvements), 2023 and 2033. The Traffic Model provides the functionality to include the traffic inputs associated with any element between 2016 and 2035; and therefore any of these can be chosen. However, the model has been populated with Project-related data for the key assessment years identified as 2020, 2023 and 2033.

The baseline and future reference case traffic scenarios have been developed to provide accurate current and future reference cases that allow for the effects that additional traffic, associated with the proposed activities of the Wylfa Newydd Project, would have on the surrounding road network.

The reference case scenarios represent future conditions that would occur in the absence of the Wylfa Newydd Project, compared with the potential traffic and transport effects associated with the effects of the Wylfa Newydd Project. The reference case scenarios take account of changes to baseline traffic flows that are predicted to occur within the study area as a direct result of unrelated committed developments, as well as the impact of local background traffic growth. Figure 7.1 summarises this process.

Figure 7.1: Reference case scenario flow chart



7.1.1 Committed developments

Committed developments comprise developments unrelated to the Wylfa Newydd Project, which have valid planning consent and which have the potential to affect existing traffic flows within the study area.

Section 4.6 has previously outlined all those committed developments that have been considered as part of the Traffic Model and their associated impacts relating to wider traffic growth. This section seeks to clarify which committed developments are 'active' and how they have been included in different scenarios and reference case years as some committed developments result in only temporary impacts.

The following committed developments have been included within the model and have a specific traffic related impact. It should be noted that Jacobs has relied on the various planning documents supporting these schemes and, therefore, dates on which these committed developments are constructed and become operational have been modelled to reflect information made available to Jacobs. This ensures that the relevant activity associated with each is captured in the appropriate baseline year. The specific assumptions relating to how each committed development has been included in the model are provided in the Strategic Traffic Model Assumptions Report. The committed developments highlighted are:

- Parc Cybi.- Stage 2.
    - Planning consent granted for two mixed-use employment developments, primarily distribution and warehousing space as well as a truck stop adjacent to the A55. The appropriate scenarios summarised previously in this report have been included as necessary in the 2020, 2023 and 2033 assessment years.
- Llanfaethlu Primary School.
    - Planning consent granted for a new primary school at Llanfaethlu to accommodate up to 150 pupils. This data has been included in all assessment scenarios.
- Land and Lakes (Penrhos).
    - A leisure and development at Penrhos representing holiday homes and chalets. The specific assumption in relation to the development phasing at Penrhos is provided in the Strategic Model

Assumptions Report. However, the appropriate scale of development informed by this phased approach is included in the 2020, 2023 and 2033 assessment scenarios respectively.

- Rhyd-y-Groes.
  - The repowering of an existing wind energy development and associated infrastructure at Rhyd-y-Groes Wind Farm. The temporary traffic construction effects associated with this committed development are included in a 2016 baseline scenario only.
- Llangefni Link Road.
  - Llangefni Link Road, to the east of the town, will link the Grŵp Llandrillo Menai Pencraig campus to the A5114 at the Lon Glanhwfa/Industrial Estate Road junction. Data provided as part of the planning documents indicate that construction of the link road is expected to occur between 2015 and 2018. Therefore, the temporary construction effects associated with this committed development are included to 2018 only.
- Anglesey Eco Park.
  - A 299 MWe Orthios Energy Centre and Eco Park in Penrhos, Holyhead. Construction of this facility has been identified to occur in 2016 and 2017. The temporary traffic construction effects of this committed development are therefore included in 2016 and 2017 baseline years only. The small operational traffic impacts are therefore included form 2018 onwards.
- Existing Power Station decommissioning.
  - The decommissioning activities of the current nuclear power station including staff movements, HGV deliveries and contractors. Detailed information relating to the inclusion of the Existing Power Station are included in the Strategic Traffic Model Assumptions Report. There is a phased ramping up of decommissioning activity, with the appropriate scale of activity informed by this phased approach included in the 2020, 2023 and 2033 assessment scenarios respectively.

Jacobs has collated information on the committed developments from a range of pertinent sources, including Environmental Statements, Transport Statements and Transport Assessments. These assumptions are highlighted in detail in the Strategic Traffic Model Assumptions Report.

The information relating to the assessment years of 2020, 2023 and 2033 have been established and included in the model. It should be noted Reasonably Foreseeable Future Projects and dependant developments are not included as part of the assessment year Reference Cases.

7.2 Project-Related Inputs

This section provides information on the various components of the Wylfa Newydd Project. These components all have specific elements associated with them, all of which require a specific input value to be input into the model. The Strategic Traffic Model Assumptions Report provides information on how input data associated with each component and element has been calculated. This process has allowed for appropriate activity for each component and element to be specified for each assessment year, capturing activity over the full construction timeline. This has ensured that each assessment year is made up of the correct components and elements have been included in the model the appropriate quantum.

A summary of the various components and elements that make up specific activity and associated model inputs for the Wylfa Newydd Project is provided below.

7.2.1 Associated Development traffic

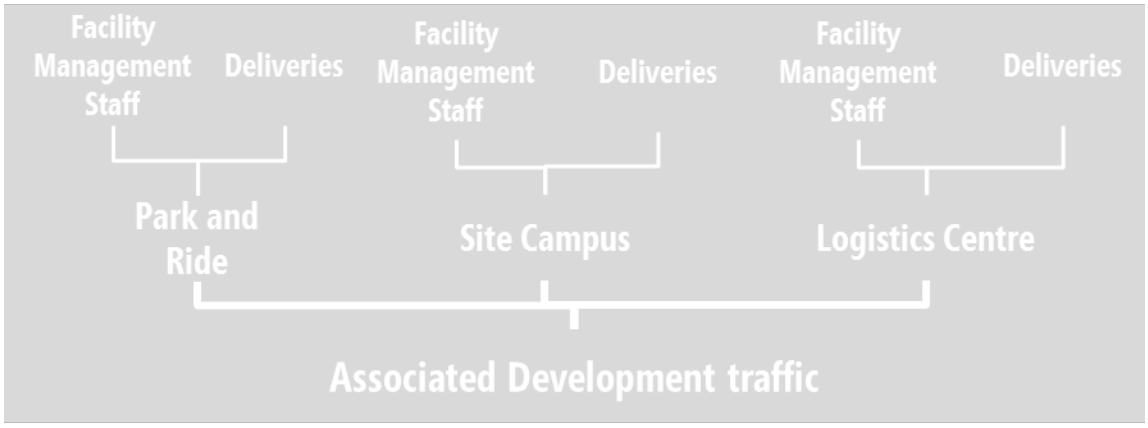
Associated Development traffic is comprised of construction traffic associated with the construction of the Associated Development, the traffic movements associated with the use of this development as part of the construction of the Power Station and the operation of these facilities. The construction of the Associated Development also includes construction staff, construction HGVs and visitor traffic related to this activity.

Figure 7.2 shows the movements related to the construction of the Associated Development. In 2020 this includes Park and Ride, Logistics Centre and Site Campus, while in 2023 the only associated development being constructed is the Off-Site Power Station Facilities comprising the MEEG, AECC and ESL.

Figure 7.2: Associated Development and Off-Site Power Station Facilities construction traffic

Figure 7.3 shows the traffic generated by the Associated Development when operational. This includes facilities management staff that operate the Associated Development and deliveries of goods to the Associated Development.

Figure 7.3: Associated Development and Off-Site Power Station Facilities traffic

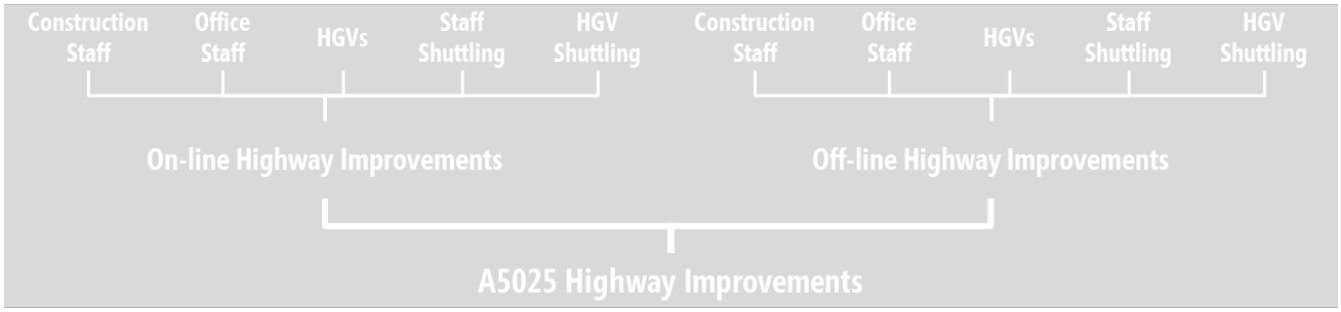


7.2.2 A5025 Highway Improvements traffic

The construction of the A5025 Highway Improvements across the western side of the A5025 would be programmed to occur between 2018 and 2020, and would generate construction traffic including HGVs, construction staff, as well as office staff based at a site office. This would also include the movement of HGVs and staff moving between the sites.

Figure 7.4 outlines the movements associated with highway improvements.

Figure 7.4: A5025 Highway Improvements traffic



7.2.3 WNDA development construction traffic

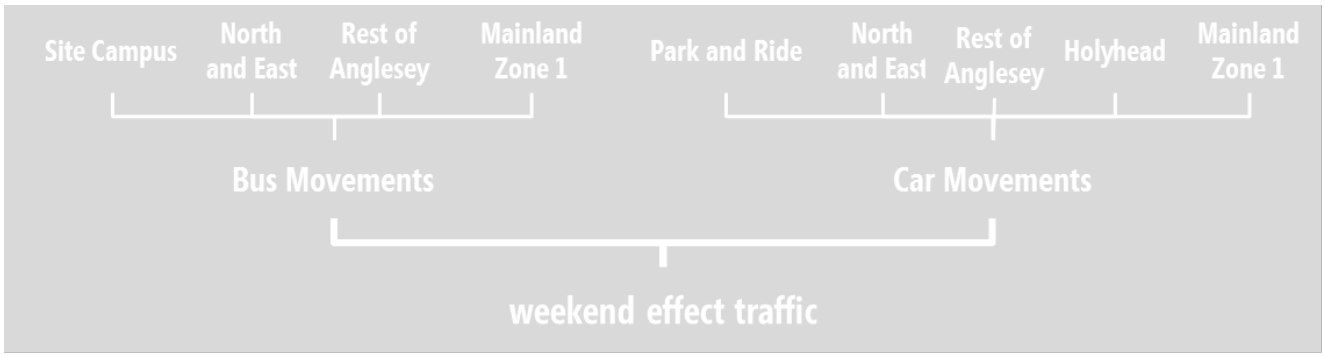
WNDA development construction traffic is comprised of all vehicle movements travelling to the WNDA development for the purposes of its construction. This includes the movement of staff from the Site Campus and Park and Ride, and direct to site vehicle movements, namely direct buses from various locations on both Anglesey and the mainland. Direct car movements of staff from various locations across Anglesey and the mainland are also included. Visitors related to the construction of the main site are also included as part of these movements.

Figure 7.5: WNDA development construction traffic

The weekend effect has also been captured within the model, allowing for a detailed analysis of movements by staff travelling home on the weekends. This includes both bus and car movements depending on the intended destination of the worker. The proportion of workers undertaking these trips and the assignment of travel mode is set out in the Strategic Traffic Model Assumptions Report.

Figure 7.6 shows these movements.

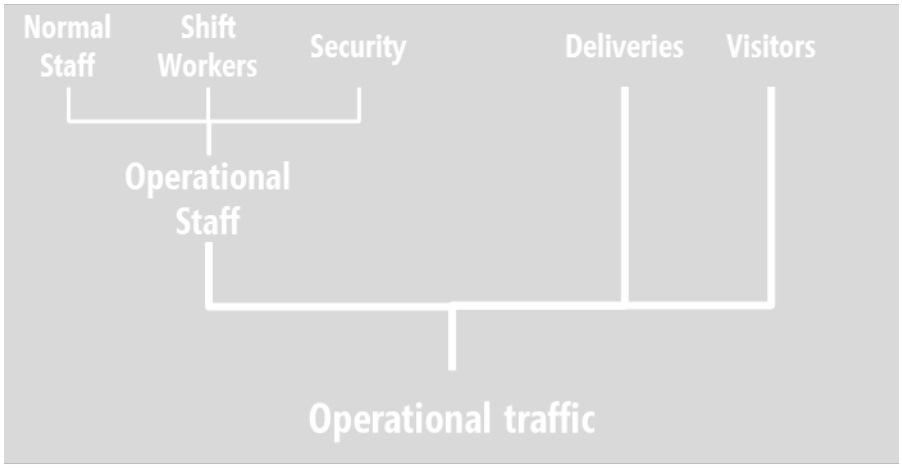
Figure 7.6: Weekend effect traffic



7.2.4 Operational traffic

From 2018 onwards there is a progressive increase in operational staff numbers as the Wylfa Newydd Project prepares to transition into full operation. The staff numbers include normal staff who work a standard day shift, shift workers operating a 12-hour split shift and security. Furthermore, there will be both visitors and HGV deliveries during the operation of the WNDA development.

Figure 7.7: Operational traffic



7.2.5 Scheduled outage

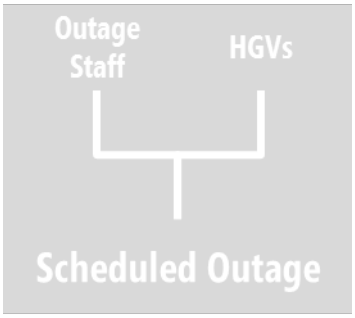
It should also be noted that periods of Scheduled Outage are expected, for both UK Advanced Boiling Water Reactors. This is to allow essential maintenance to be undertaken. The outages are scheduled to occur on a specific timetable every six months. The year 2033 represents the worst-case future year in which two Scheduled Outage periods are forecast to occur whilst also representing the year with the highest level of background traffic as well as occurrence of a double outage event. A table of forecast Scheduled Outages is included.

Table 7.1: Scheduled Outages

Year	Type of outage
2027	Single outage
2028	Single outage
2029	Single outage
2030	Double outage
2031	Single outage
2032	Single outage
2033	Double outage
2034	Single outage
2035	Single outage

The Scheduled Outage results in an increase in staff on the site for a period of six weeks and this implies an uplift in staff and associated vehicular trips. Figure 6.8 shows the traffic included as part of a Scheduled Outage.

Figure 7.8: Scheduled Outage traffic



All periods of Scheduled Outage that are forecast to occur from 2027 have been included in the model, ensuring the effect of outage is accurately included should an alternative year of operation be assessed.

7.3 Wylfa Newydd Project Assessments

These scenarios include all staff and HGV related movements for the Wylfa Newydd Project, Associated Development and Off-Site Power Station Facilities. It has been agreed with Horizon that one Wylfa Newydd Project design scenario would be considered in three different assessment years. These assessment years can be summarised below:

- Year A - 2020

  Year A represents the year of A5025 Highway Improvements opening/peak of Associated Development construction). This assessment year definition is based on preliminary analysis of monthly HGV traffic that shows a 'mini-peak' for constructing the Associated Development and Off-site Power Station Facilities is likely to occur in the same year as the opening of the A5025 Highway Improvements. Therefore, for 2020, two sub-scenarios have been modelled against a Reference Case of no Wylfa Newydd Project traffic including:

  - Year A1: Wylfa Newydd Project traffic using the A5025 after the opening of the A5025 Off-line Highway Improvements against a reference case of no Wylfa Newydd Project traffic and no consideration of the A5025 Off-line Highway Improvements; and

- Year A2: An additional assessment of Wylfa Newydd Project traffic which would travel on the A5025 following the opening of the A5025 Off-line Highway Improvements.

- Year B - 2023

  Year B represents the peak year of construction with the highest level of construction traffic generated by the combination of the daily arrival and departure of construction workers and delivery of equipment, goods and materials to and from site. This assessment considers an assessment of the Wylfa Newydd Project traffic with the A5025 Off-line Highway Improvements in operation against a Reference Case of no Wylfa Newydd Project traffic and no A5025 Off-line Highway Improvements.

- Year C - 2033

  Year C represents the peak year of operation. This includes the construction of the Radioactive Waste Buildings as well as the occurrence of two periods of scheduled outage. This assessment considers an assessment of the Wylfa Newydd Project traffic with the A5025 Off-line Highway Improvements in operation against a Reference Case of no Wylfa Newydd Project traffic and no A5025 Off-line Highway Improvements.

  The remainder of this section details the various elements and components of the Wylfa Newydd Project that are captured within each year, specific to the particular activity that has been assumed to occur in each assessment year.

7.3.1 2020 – Wylfa Newydd Scenario (A5025 Bypass Opening/Peak of Associated Development Construction)

This scenario focuses on a number of key Wylfa Newydd Project elements including the following:

- A5025 Off-line Highway Improvements;
- Weekend effect;
- Operational Traffic;
- Associated Development; and
- WNDA development construction.

This includes all committed development traffic associated with 2020. This scenario includes predominantly construction staff, HGV/LGV and visitor vehicular trips. Associated Development and Off-Site Power Station Facilities construction is forecast to occur between 2019 and 2021. The peak year for the construction of Associated Development and Off-Site Power Station Facilities has been identified as 2020.

There are occurrences of overlap between Associated Development being constructed and in operation for use as part of the overall construction of the main site. This can be seen at the Park and Ride for example, where its construction is ongoing throughout 2020, but it is operational from 2020. The Logistics Centre is also under construction during 2020, until quarter 4. However, by this stage the Logistics Centre is already in operation since quarter 3. Therefore, for the first two quarters of 2020, all HGV traffic associated with main site construction routes directly to the main site.

The A5025 Highway Improvements are forecast to be constructed between 2019 and 2020 (for Off-line sections). The completion of Off-line sections is forecast by quarter 4 of 2020.

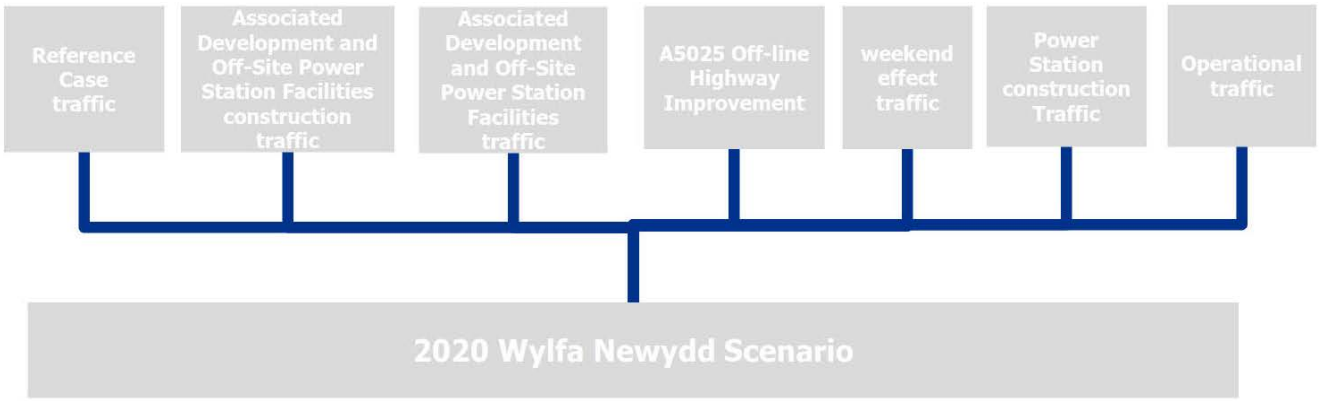
This scenario also includes construction staff movements associated with the key construction activities from the areas identified in Figure 4.3; and their movements related to the weekend effect.

HGV deliveries associated with construction of the main site are captured, and have been assumed to route from the mainland via the Logistics Centre once operational.

A small number of operational staff is also included.

The main traffic inputs for the full Wylfa Newydd Project scenario for the 2020 Wylfa Newydd scenario is summarised in Figure 6.9:

Figure 7.9: 2020 Wylfa Newydd scenario



7.3.2 2023 – Wylfa Newydd scenario (peak of WNDA development construction)

This scenario focuses on a number of key construction elements including the following:

- WNDA development construction
- Weekend effect;
- Operational traffic;
- Associated Development; and
- Off-Site Power Station Facilities.

This scenario includes all committed development traffic associated with 2023. This scenario includes predominantly construction staff, HGV/LGV and visitor vehicular trips with 2023 identified as the peak year of WNDA development construction.

During Main Construction, the operational effect of the Associated Development and Off-Site Power Station Facilities are captured, notably the facilities management and servicing vehicles associated with all Associated Development and Off-Site Power Station Facilities.

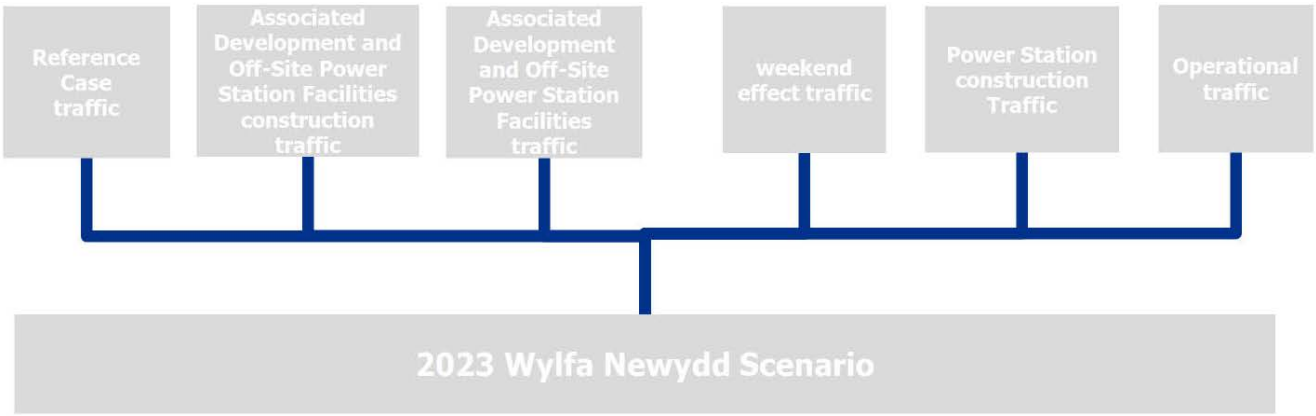
This scenario is mainly made up of WNDA development construction staff movements from the areas identified in Figure 4.3; Worker Origin Locations. Vehicle movements related to staff travelling home for weekends are also captured within this scenario.

HGV deliveries associated with construction of the main site are captured, and have been assumed to route from the mainland via the Logistics Centre.

As with 2020, operational staff have been included but these are still a low number overall.

The main traffic inputs for the full Wylfa Newydd Project scenario for the 2023 Wylfa Newydd scenario is summarised in Figure 7.10.

Figure 7.10: 2023 Wylfa Newydd scenario



7.3.3 2033 – Wylfa Newydd scenario (full operation with Scheduled Outage)

This scenario includes all staff included for the operation of the WNDA development and the operation of Off-Site Power Station Facilities (namely the MEEG, AECC and ESL) once construction has been completed. This includes staff and visitors travelling to the site by car from the locations shown in Figure 4.3.

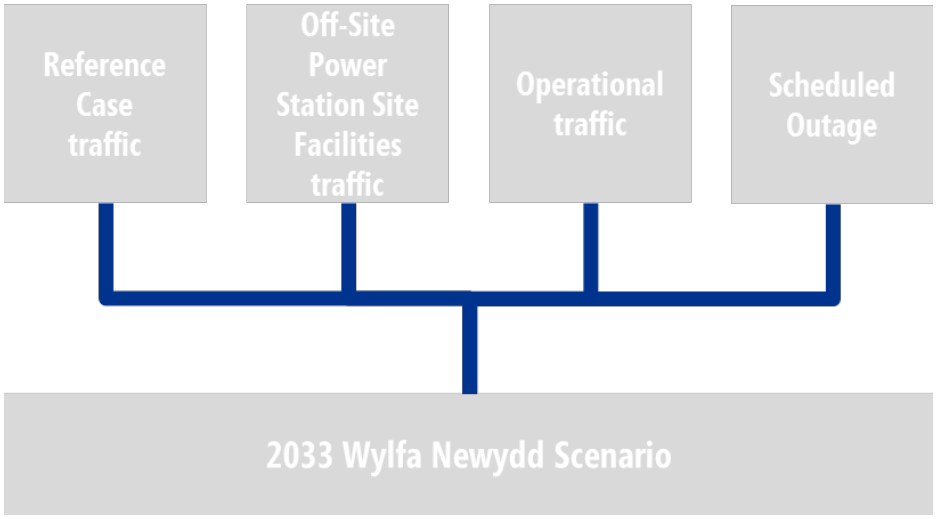
2033 reflects the peak year of operation and captures both the standard operation of the Power Station (and Off-Site Power Station Facilities) as well as the following:

- traffic associated with Scheduled Outage (two occurrences in 2033); and
- traffic associated with the construction of Radioactive Waste buildings.

In addition to the operation of the main site, there will also be HGV traffic included in 2033, associated with the construction of Radioactive Waste buildings (due to be constructed between 2033 and 2035).

Figure 7.11 summarises the traffic movements related to the 2033 Wylfa Newydd scenario.

Figure 7.11: 2023 Wylfa Newydd scenario (peak operation)



7.4 Decommissioning

The works required to decommission the WNDA development would be subject to a separate EIA, which would assess the environmental effects of decommissioning activities at that time. It is expected that worker vehicle numbers and HGVs associated with decommissioning activities are likely to be similar to those associated with the construction stage. Changes in traffic flows and composition would therefore likely give rise to effects comparable in significance to those identified for the construction stage.

The decommissioning activities associated with Associated Development facilities have not been included in the Traffic Model. It is anticipated that Associated Development sites would cease operating in 2027 and would be decommissioned thereafter; this applies to the Site Campus, the Park and Ride and the Logistics Centre. It is expected that decommissioning activities would generally be commensurate with construction of these facilities. However, in a number of cases, facilities are likely to be converted to retain a legacy use (i.e. temporary accommodation conversion to permanent housing), therefore reducing the overall traffic impacts. Additionally, the Off-Site Power Station Facilities would be retained and therefore the cumulative impacts of Associated Development, Off-Site Power Station Facilities and construction would not be experienced during Associated Development decommissioning. As such, the cumulative traffic impacts are not anticipated to be greater than the traffic impacts included within the construction scenarios.

8. Assumptions

A comprehensive Strategic Traffic Model Assumptions Report has been produced for the Strategic Traffic Model; this includes all the assumptions used to generate model input the data that has been used to populate the model with information relating to committed development and Wylfa Newydd Project related activity. The Strategic Traffic Model Assumptions Report identifies the latest assumptions used to furnish the latest version of the Strategic Traffic Model, representing Strategic Traffic Model Phase 2, Rev 1.

It also identifies the methodology used in deriving input data that has been used to populate the model. This report, the Strategic Traffic Model Assumptions Report, should be read alongside this Strategic Traffic Model Method Statement Report to provide a full understanding of the model, what it represents and the data included within it.

These are covered in the Strategic Traffic Model Assumptions Report.

9. Summary

In summary, this Strategic Traffic Model Method Statement Report seeks to outline the updates and processes that have been implemented during the iterative development of the Strategic Traffic Model. The current version of the model has recently benefitted from a comprehensive update such that it represents an appropriate modelling tool capable of accommodating the various nuances associated with the full cumulative traffic effects of the Wylfa Newydd Project, background traffic growth and relevant committed developments.

The model is therefore considered to represent a tool that accurately reflects the traffic impacts generated by the development activity over its construction and operation periods, whilst also reflecting a model of sufficient extent to provide a multi-disciplinary assessment tool able to support the application for a Development Consent Order.

The development of the Traffic Model from its original conception to the most recent version has been an iterative process. In order to achieve the multi-purpose functionality that is required, a number of updates have been implemented. These updates have been based around:

- inclusion of additional base traffic count data;
- inclusion of additional night-time hours;
- full modular approach with full switch on/switch off functionality;
- additional and more extensive model input data; and
- alternative model structure.

Through these updates, the model now captures all the key roads of Anglesey and is capable of modelling any specific element, or range of elements, chosen with an updated approach that enables modelling multiple years, shifts or bypass scenarios to be assessed.

The Strategic Traffic Model includes all years between 2016 and 2035 and includes all relevant committed development traffic and background traffic growth. In addition, the model captures all Associated Development and Off-Site Power Station Facilities construction and operation, including the start and peak of construction as well as the operational phase (including Scheduled Outage).

The model provides an extensive range of outputs by location, time period and road type. Main outputs include 24-hour AADT and 18-hour AAWT flows, and hourly traffic flows for all 24 hours of a day for a range of different time periods (e.g. weekends/weekdays).

Appendix A – Strategic Traffic Model Assumptions Report

Wylfa Newydd Project

Horizon Nuclear Power Limited

Traffic and Transportation - Traffic Model Method Statement

60PO8048-JAC-TAT-REP-00010 | 3.0

11 January 2018

WN016-JAC-OS-REP-00010

Document history and status

Revision	Date	Description	By	Review	Approved
1	15/06/17	Original	GT	SNM	GM
2	5/10/17	Client comments	GT	SNM	GM
3	11/1/18	Rev1.0 changes	MF	DP	RB

Wylfa Newydd Project

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Project Manager:	Robert Bromley
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1. Overview of Report – Traffic Model Assumptions

Due to the complexity and scale of the model, a considerable volume of data has been produced to represent inputs to the model. This predominantly relates to the staff and vehicle movements associated with all elements of the construction and operational phases of the Project as well as identifying appropriate timelines for each activity. This report therefore sets out the calculations and assumptions used in deriving model input data whilst also clearly identifying how data have been incorporated into the model structure itself.

Information relating to the Wylfa Newydd Project was initially requested from Horizon. Responses were collated from a variety of sources. Sources include Horizon, Jacobs, various third-party consultants (e.g. RSK, Arup and Aecom) and the IACC. It has been assumed that these sources of information provide an accurate representation of the information necessary to inform the model.

Subsequent information was provided by Horizon following changes in the scope of development. It has therefore been necessary to use a combination of this information and the previously issued Technical Responses to generate updated model input data. Where information has not been superseded, it has been assumed that information provided in Technical Responses remain valid.

The information provided in Technical Responses and by Horizon does not use a uniform format that aligns with the specific structure of the model. It has therefore been necessary to reconfigure this information in such a way that it would represent a consistent format that would easily be input into the structure/functionality of the Traffic Model.

1.1. Report Structure

The report is structured to summarise the four fundamental stages of standardising information provided in Technical Responses to enable inclusion in the Traffic Model. This includes:

- stage 1: producing vehicle numbers;
- stage 2: profiling vehicle numbers; and
- stage 3 and stage 4: Traffic Model specific data input assumptions.

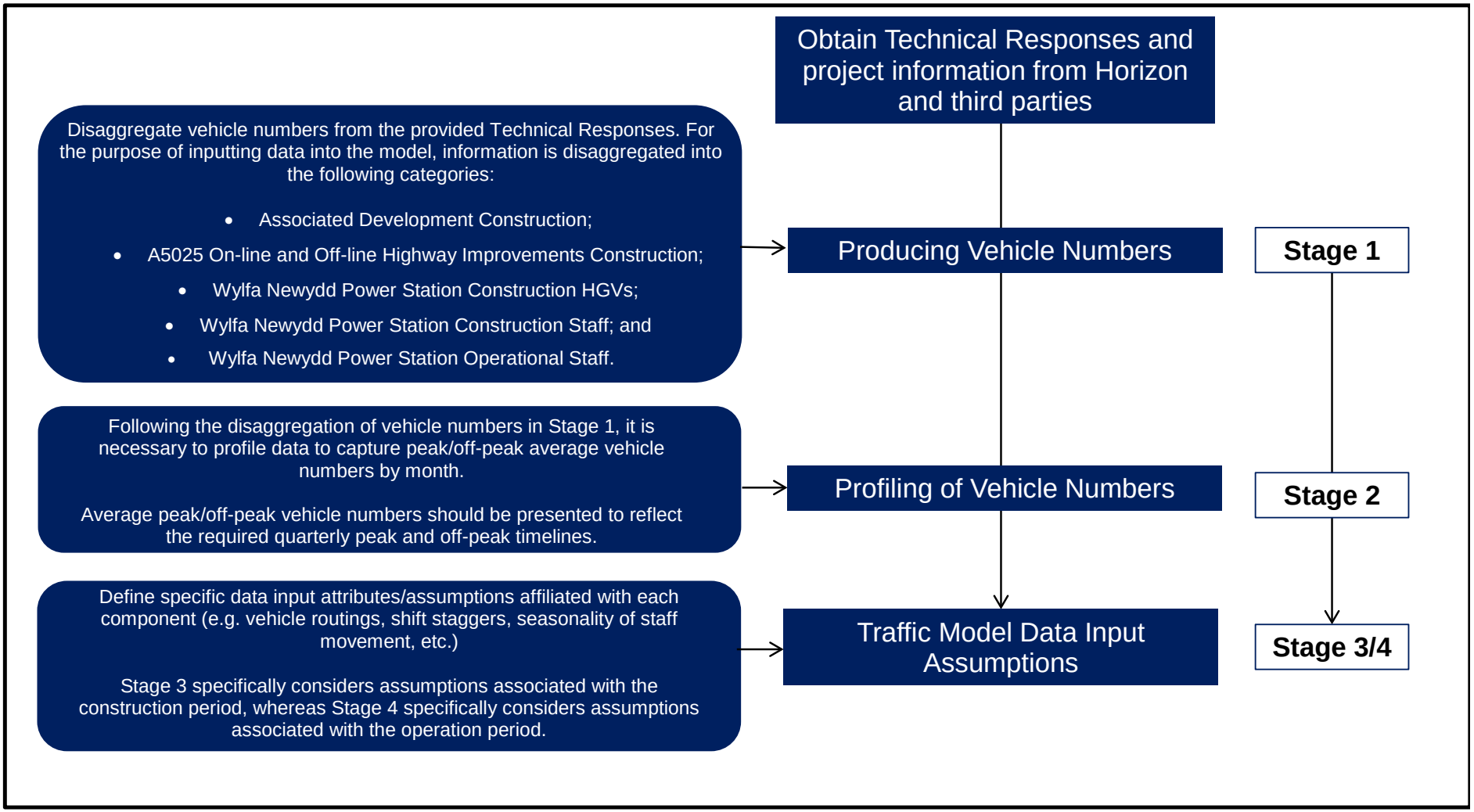
Figure 1.1 overleaf provides a summary of the key stages and processes captured within each stage and summarised in later sections of this report. The report provides a brief overview of the process undertaken for each stage, outlining the general assumptions and logic that were used to breakdown the information provided in Technical Responses. Assumptions generally relate to the handling of information received in Technical Responses; however, in some instances, assumptions were used to supplement absences in data identified in the Technical Responses gaps analyses. Instances where additional assumptions have been necessary have been clearly identified in this report.

1.2. Exclusions

This report summarises the methods that have been employed to standardise model input data, and professional judgement used to fill any gaps in relation to the information provided. It does not identify assumptions in relation to elements of the Project that have not specifically been referenced and included in the information provided, or requested to be included in the model by Horizon.

The Strategic Traffic Model Assumptions Report should be read in conjunction with the Strategic Traffic Model Method Statement Report prepared by Jacobs. The Method Statement Report provides a detailed description of the model development, its structure and functionality.

Figure 1.1: Summary of stages



2. Stage 1: Producing Vehicle Numbers

2.1. Introduction

This section of the report considers assumptions relating to Stage 1: Producing Vehicle Numbers. Stage 1 consists of deriving headline vehicle numbers used to inform Traffic Model inputs. In order to accommodate the granularity required of Traffic Model outputs, vehicles numbers for components of the Power Station construction and operation are disaggregated by vehicle mode. A number of the assumptions informing the derivation of model inputs relates to information detailed within App C2-4 Appendix F (Application Reference Number: 6.3.20).

RSK were appointed by Horizon to prepare App C2-4 Appendix F (Application Reference Number: 6.3.20). This has been prepared to describe the emerging transport proposals associated with construction workers required for the Wylfa Newydd Project. It describes how they integrate with each other to provide a comprehensive strategy, which has been developed following feedback received on the emerging Wylfa Newydd Project through formal consultation and ongoing stakeholder engagement.

Numerous assumptions taken from App C2-4 Appendix F (Application Reference Number: 6.3.20)and referenced throughout the subsequent sections of the report relate to home-based and non-home-based worker travel. The following definitions should be considered when either type of vehicle commute is considered:

- Home-based workers

Gravity modelling work undertaken in support of the socio-economic assessment indicates that up to 2,000 home-based construction workers are expected to be drawn from within a 90-minute journey time of their construction site. These workers would benefit from living in established settlements with local facilities. Based on the analysis undertaken, around two-thirds of home-based workers are anticipated to live on Anglesey with the remainder living on the mainland.

The analysis, which includes a distance weighting, indicates that that the majority of home-based workers would be drawn from the larger settlements on Anglesey and north Wales. These include, though not exclusively, Holyhead, Amlwch, Benllech, Llangefni, Bangor and Caernarfon.

- Non-home-based workers: existing accommodation/existing workers

Gravity modelling work undertaken in support of the socio-economic assessment indicates that up to 3,000 non-home-based workers are expected to be drawn from within a 90-minute journey time of the WNDA development. Therefore the majority of these workers are likely to commute to North Wales on a fortnightly basis from their permanent home.

The analysis indicates that the majority of non-home-based workers would reside in accommodation predominantly located on the north and west of Anglesey. These include, though not exclusively, Holyhead, Cemaes, Amlwch and Benllech. In addition, approximately 15% of the non-home-based workers are anticipated to reside off Anglesey, predominantly in Bangor.

- Non-home-based workers: Site Campus

The gravity modelling work undertaken in support of the socio-economic assessment also indicates that up to 4,000 non-home-based workers would reside in Site Campus, provided by Horizon, in the north of Anglesey. Therefore, a large proportion of these workers are likely to commute to North Wales on a fortnightly basis from their permanent home. However, those workers who are based outside of the UK, who are more likely to reside in Site Campus, may commute less frequently.

These sites would be constructed in phases to meet the expected demand of workers throughout the construction phase of the Wylfa Newydd Project. Therefore, the provision of accommodation would fluctuate over time and may result in less than 4,000 bed spaces at the peak of construction should the existing accommodation cater for the needs of workers or worker numbers be less than expected.

In order to capture and effectively process the information sources and various assumptions applied, Jacobs has generated a single source spreadsheet, capturing all the necessary input data, assumptions and resulting output data forming the inputs to the model, as based on the information provided above. This spreadsheet forms the function of calculating and profiling the vehicle numbers for model input, as summarised in Stage 1 and 2 of this report. The spreadsheet is designed to use a series of iterative processes to disaggregate headline vehicle numbers for the following group of the Wylfa Newydd Project elements:

- Associated Development construction;
- A5025 Highway Improvements construction;
- Wylfa Newydd Power Station construction HGVs;
- Wylfa Newydd Power Station construction staff; and
- Wylfa Newydd Power Station operational staff.

Each group of elements varies in the assumptions used to disaggregate vehicle numbers, and different vehicle modes are present in each group. Figure 2.2 presents the breakdown of the specific elements and vehicles modes captured in each group.

For construction related activity, Jacobs has been provided with a summary profile of all HGV traffic associated with the Wylfa Newydd Project. This information is summarised in Figure 2.3 below and underpins much of the base data on which secondary assumptions such as distribution have been applied.

Figure 2.2: Overview of project element

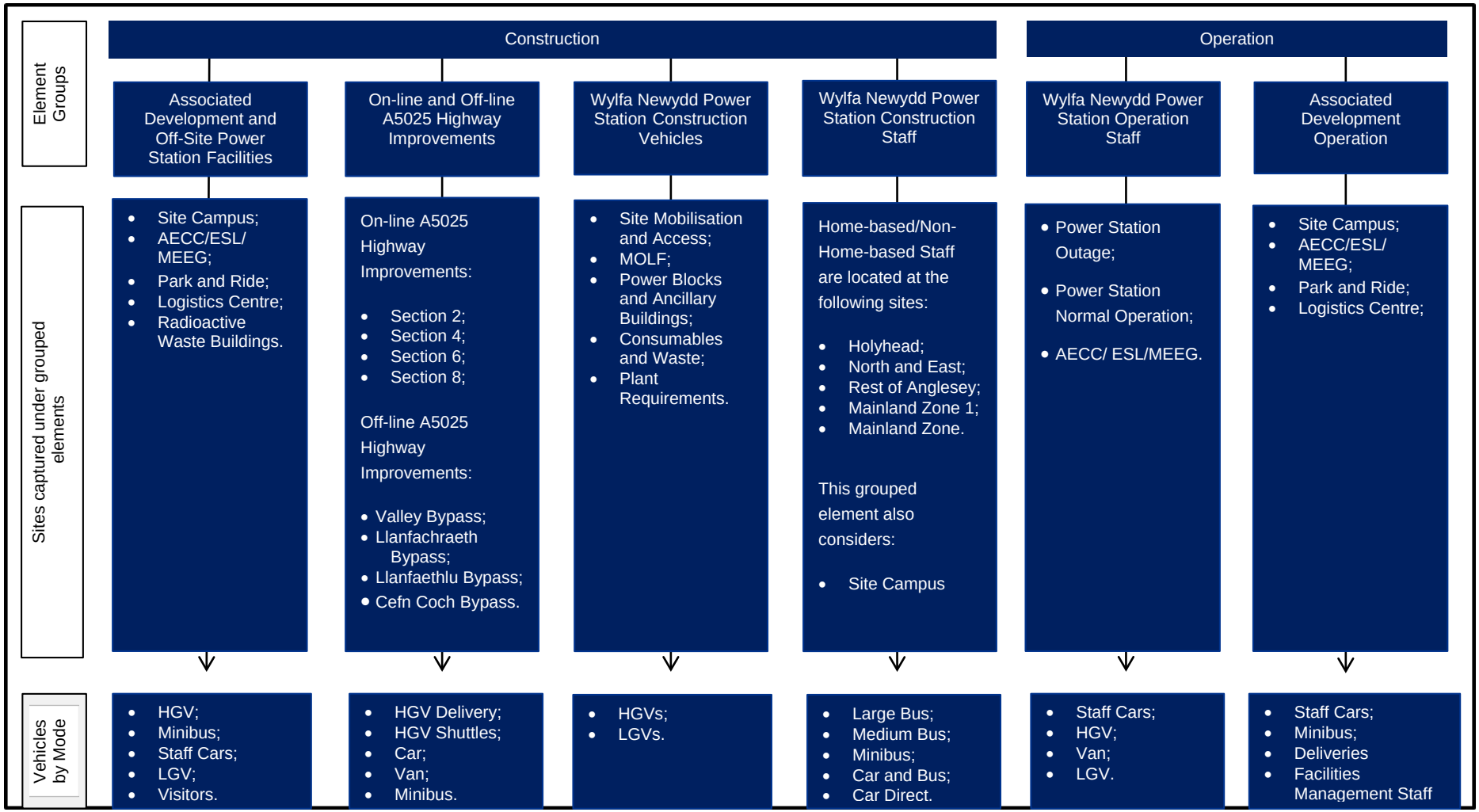
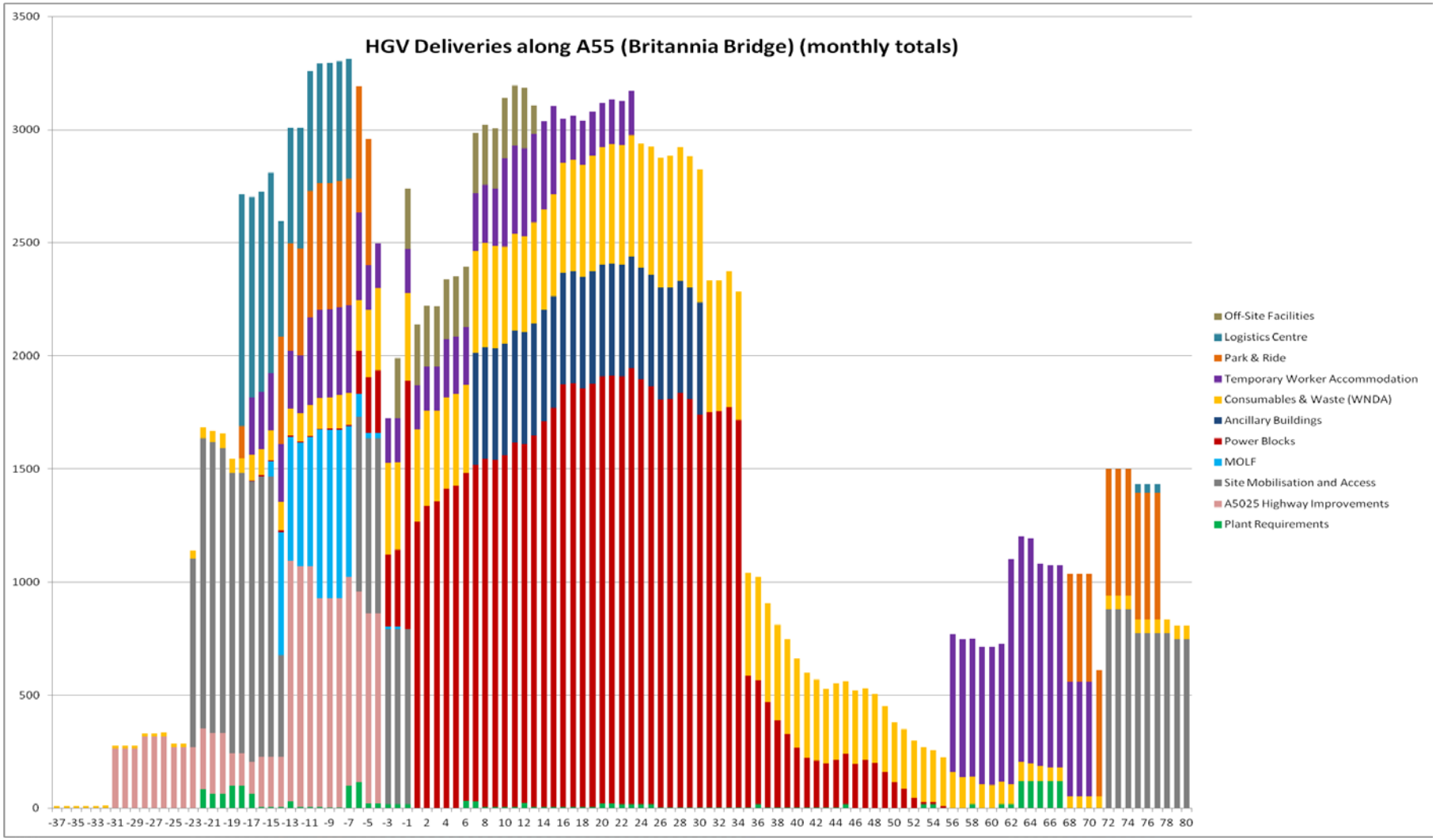


Figure 2.3: HGV construction traffic profile


HGV Deliveries along A55 (Britannia Bridge) (monthly totals)
3500
3000
2500
2000
1500
1000
500
0
-37 -35 -33 -31 -29 -27 -25 -23 -21 -19 -17 -15 -13 -11 -9 -7 -5 -3 -1 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80
Off-Site Facilities
Logistics Centre
Park & Ride
Temporary Worker Accommodation
Consumables & Waste (WNDA)
Ancillary Buildings
Power Blocks
MOLF
Site Mobilisation and Access
A5025 Highway Improvements
Plant Requirements

2.2. Associated Development and Off-Site Power Station Facilities Construction

2.2.1. Introduction

Associated Development refers to the developments required to support the construction of the Power Station. As highlighted in Figure 2.2, elements grouped under Associated Development construction include the following Associated Development sites:

- Site Campus;
- AECC/ESL/MEEG;
- Park and Ride;
- Logistics Centre; and
- Radioactive Waste Buildings.

2.2.2. Headline vehicles by mode

Horizon provided headline information across the individual construction timelines of each Associated Development. Information was provided for two components:

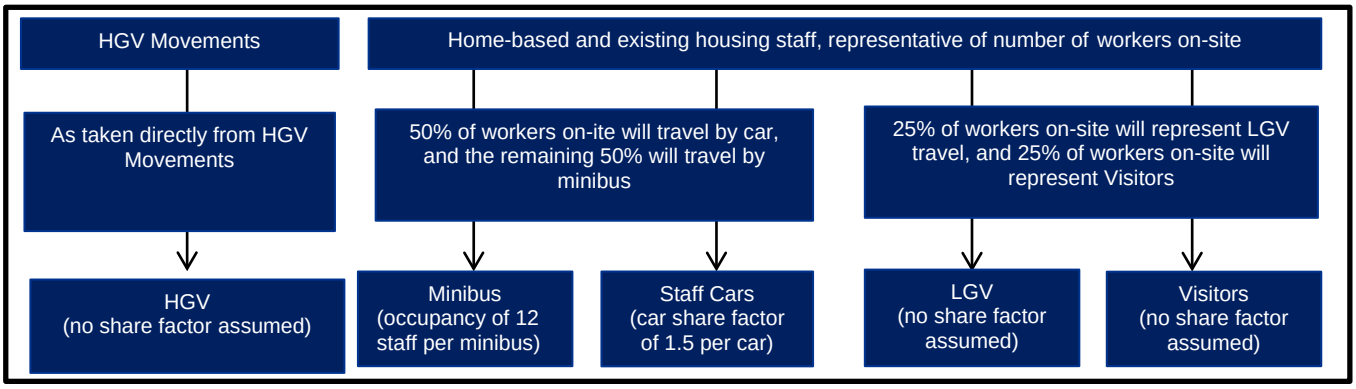
- HGV movements; and
- home-based and existing housing staff, representative of number of workers on-site.

For HGV movements, Horizon provided whole numbers representing one-way HGV movements across a monthly timeline applicable to each Associated Development sites' construction period. As no further calculations were required to disaggregate HGV numbers, these values could be taken directly from HGV values for Associated Development sites' and be fully representative of HGV movements.

Alternatively, for the workers on-site during construction, values were provided representing worker numbers from home-based and non-home-based locations across the construction timeline of Associated Development sites'. Values for non-home-based and home-based workers were summed, to represent the total amount of workers commuting to Associated Development sites', independent of location. Distributions were applied at later stages of the process to capture necessary consideration of the commute by location and where accommodation was non-home-based or home-based. To distribute workers by vehicle mode, calculations initially issued in Technical Responses provided by Horizon have been applied to headline values for the number of workers on-site, to derive vehicle numbers by mode for the construction period of Associated Development sites'.

Figure 2.4 provides an overview of this process and the assumptions applied to generate vehicle numbers associated with the two components.

Figure 2.4: Associated Development construction: Generation of vehicles by mode



As stated above, values representing HGV numbers have been derived directly from a construction summary profile provided by Horizon. It should be noted that timelines for HGV movements are not always consistent with that of the full construction timeline of the site, and on occasion construction workers are considered to be operational on-site without the requirement of associated HGV movements. In such instances, it is considered that HGV movements are associated predominantly with construction material depositary.

The number of workers on-site per day was derived from the sum of home-based and non-home-based workers operating at Associated Development sites' during the construction period. The profile of workers on-site varies by month over the stated construction period of Associated Development sites'. Calculations based on assumptions provided by Horizon have been used to disaggregate the modal split of vehicles from the headline profile of workers on-site. The same assumptions were applied for the construction of Associated Development sites'. Figure 2. presents an overview of these calculations, which are explained in more detail below:

- minibus: it has been assumed that half the workers on-site travel by minibus, with minibus occupancy equal to 12 passengers per minibus;
- cars for workers: it has been assumed that the remaining half the workers on-site travel by car. Car occupancy is assumed 1.5 passengers per vehicle;

Values for the number of workers on-site were also used to derive vehicle numbers relating to the number of visitors and LGVs generated during the construction of Associated Development sites'. These assumptions were based on the assumption that if Associated Development sites' required a certain amount of workers, the relating proportion of additional visitors/LGVs would be required for the construction period, whereby:

- cars for visitors: it has been assumed that visitor numbers would be equivalent to 25% of the workers on-site. No car share factor has been applied for visitors.
- Vans/LGVs: it has been assumed that LGV numbers would be equivalent to 25% of the workers on-site. No vehicle occupancy or vehicle share factor has been applied.

2.3. A5025 Highway Improvements Construction

2.3.1. Introduction

The A5025 On-line and Off-line Highway Improvements refer to infrastructure upgrades to the A5025 to improve safety and reduce traffic along particularly sensitive sections of this arterial route, leading to the Power Station. The vehicles required for the construction of A5025 On-line and Off-line Highway Improvements have been broken down into two categories, as provided in technical information provided by Horizon and further supplementary information provided by RSK, and these include:

- A5025 On-line Highway Improvements (i.e. upgrades to the existing road networks); and
- A5025 Off-line Highway Improvements (i.e. bypasses).

Traffic Model inputs have been designed to represent individual sections of the A5025 On-line and Off-line Highway Improvements.

2.3.2. Headline vehicles by mode

RSK provided a timeline of HGV delivery movements associated with the A5025 On-line and Off-line Highway Improvements per month. Monthly totals have been divided over a 22-day period to represent the daily HGV movements for weekday HGV operation. HGV movements would not be operational during a Saturday or Sunday; therefore, it has been assumed HGVs would operate over weekdays only. The values used are therefore considered to be conservative as they make no allowance for activity on a Saturday.

HGV delivery movements have been used as direct values to represent HGV deliveries. Information provided by Horizon identified peak and pro-rata vehicle factors that have been applied to the construction HGV delivery profile to disaggregate the remaining vehicles modes required for the A5025 On-line and Off-line Highway Improvements. This is with the exception of vehicle numbers generated for cars and the home-based and non-home-based construction workers assigned to the construction programmes for the A5025 On-line and Off-line Highway Improvements. All car journeys for the A5025 On-line and Off-line Highway Improvements assumed a car share factor of 1.5 per vehicle.

The different modes captured for the A5025 On-line and Off-line Highway Improvements are considered in more detail below.

The A5025 On-line Highway Improvements include the widening and reconstruction of the highway network. RSK also assigned movements for miscellaneous vehicles to assist with construction. Vehicle movements associated with the A5025 On-line Highway Improvements include:

- HGV deliveries;
- HGV shuttles (transfer of materials between each section and recycling centre);
- car;
- van; and
- minibus shuttle (transfer of construction workers between each section).

Information in Table 2.1 below was issued by Horizon, and shows the vehicle information that should be applied to headline on-line HGV delivery vehicles to disaggregate construction vehicles by mode.

Table 2.1: Peak and pro-rata vehicles factors by mode (A5025 On-line Highway Improvements)

Section	Class	Pro-rata vehicles
	HGV deliveries	No factor (direct value as provided by RSK)
On-line	HGV shuttles (between each section and recycling centre)	28
	Van	12
	Minibus shuttle (construction workers to each section)	8

The A5025 Off-line Highway Improvements include construction phases attributed to earthworks, structures and pavements. Vehicle movements associated with the A5025 Off-line Highway Improvements include:

- HGV deliveries;
- HGV shuttles;
- car; and
- minibus and van.

Information in Table 2.2 below was issued by Horizon, and shows the vehicle factors that should be applied to headline off-line HGV delivery vehicles to disaggregate construction vehicles by mode.

Table 2.2: Peak and pro-rata vehicles factors by mode (A5025 Off-line Highway Improvements)

Section	Class	Pro-rata vehicles factors
Off-line	HGV deliveries	No factor (direct value as provided by RSK)
	HGV shuttles	102
	Van	11

The above factors in Table 2.1 and Table 2.2 were proportioned against the profiles of HGV deliveries from the A5025 On-line and Off-line Highway Improvements HGV delivery timelines, respectively as identified in the construction profile summary provided to Jacobs and highlighted in Figure 2.3.

2.4. Wylfa Newydd Power Station Construction Vehicles

2.4.1. Introduction

This section refers to the vehicles required for the construction of the various components that compromise the Wylfa Newydd Power Station. RSK provided information superseding the previously issued Technical Responses, detailing the headline HGV and LGV numbers required for the construction of various components captured in the main site construction.

The Wylfa Newydd Power Station (or WNDA development) includes the following elements of development:

- site mobilisation and access;
- MOLF;
- power blocks;
- consumables and waste; and
- plant requirements.

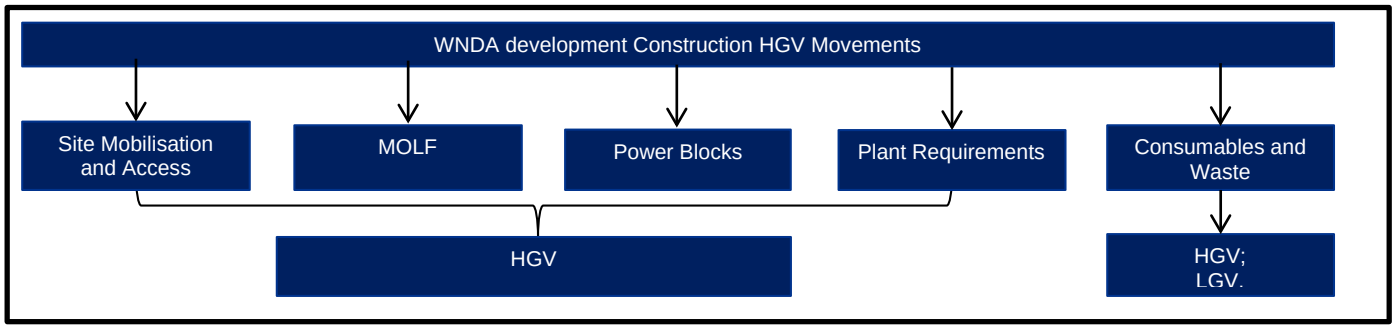
2.4.2. Headline vehicles by mode

RSK provided HGV and LGV numbers across the individual construction timeline for each element captured under Wylfa Newydd Power Station; this represented monthly totals for construction vehicles. This information varied, whereby:

- only HGV movements have been provided for site mobilisation and access, MOLF, power blocks and plant requirements; whereas
- HGV and LGV movements were provided for construction associated with consumables and waste.

Figure 2.5 provides an overview of this breakdown.

Figure 2.5: summary of Wylfa Newydd Power Station construction developments and relating vehicle modes



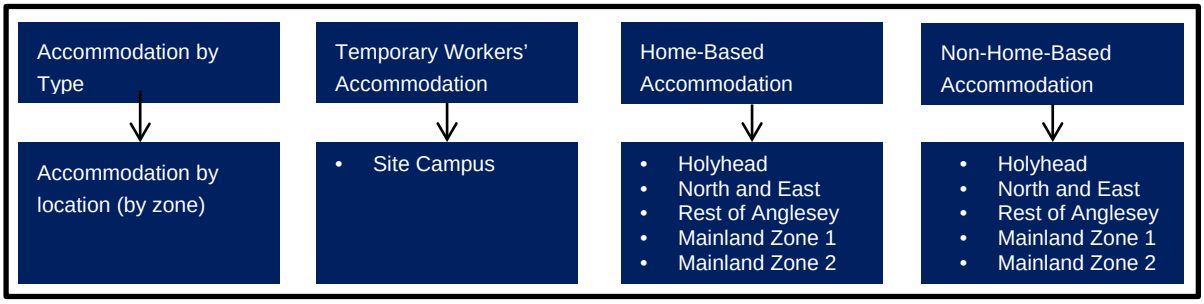
It has been assumed that construction movements associated with the WNDA development would not be operational during a Saturday or Sunday. Monthly totals provided for construction vehicles have been divided over a 22-day period to represent the daily HGV/LGV movements for weekday construction.

2.5. Stage 1: Wylfa Newydd Power Station Construction Staff

2.5.1. Introduction

Traffic Model inputs are required for WNDA development construction staff. For the purpose of model inputting, construction staff have been grouped in accordance to the specific accommodation type in which it is expected they will reside, and the zone of commute by location. Figure 2.6 provides an overview of the various locations provided for the origin commute of workers, with accompanying text below to define accommodation by type.

Figure 2.6: Summary of accommodation by accommodation type and location for main site construction staff



- Site Campus: refers to workers' accommodation that would be temporarily constructed for staff working over the construction period of the WNDA development. Staff located at Site Campus do not have permanent residency within a commutable distance from the WNDA development, and therefore require temporary accommodation throughout the working week. Site Campus will be constructed on-site, within the Wylfa Newydd Development Area.
- Home-based workers' accommodation: refers to accommodation for construction workers that make up the required proportion of staff living local to Anglesey and mainland UK. These workers already live within the surrounding commutable areas of the Power Station, and therefore use their permanent place of residency as accommodation throughout the construction period;
- Non-home-based workers' accommodation: staff located at non-home-based accommodation do not have permanent residency within a commutable distance from the Power Station, and therefore require alternative accommodation throughout the working week. Non-home-based accommodation refers to accommodation for workers who temporarily live within the vicinity of Wylfa Newydd Development Area for work, but in accommodation that was not built for the purpose of WNDA development, (e.g. workers are accommodated through sub-let, homestay or private rental accommodation).

Horizon provided total headline worker numbers for construction staff by accommodation type (i.e. Site Campus, home-based accommodation, and non-home-based accommodation). Worker numbers were assumed to represent the typical amount of construction workers operating per weekday, as profiled by month. This was not proportioned by location of accommodation.

To aid model inputting, which relied heavily on routing commute by location (further information is provided in Section 3), proportions based on Gravity Model data were applied to headline worker numbers for home-based and non-home-based accommodation, to disaggregate headline worker numbers by location. This process did not apply to worker numbers for Site Campus, as all headline worker numbers provided have been assumed to route to/from the Site Campus located within the Wylfa Newydd Development Area, and therefore did not need to be disaggregated by location.

Table 2.3 shows the number of workers attributed to each location for home-based accommodation, and the resultant proportions applied to home-based accommodation headline worker numbers to disaggregate worker numbers by location of commute. Similarly, Table 2.4 shows the number of workers attributed to each location for non-home-based accommodation, and the resultant proportions applied to non-home-based accommodation headline worker numbers to disaggregate worker numbers by location of commute.

Table 2.3: Proportions applied to home-based accommodation headline worker numbers by zone

Location by zone	Home-based accommodation (worker numbers by zone)	Approximate proportions applied to headline workers for home-based accommodation by zone
North and East	591	30%
Holyhead	214	11%
Rest of Anglesey	452	23%
Mainland Zone 1	127	6%
Mainland Zone 2	616	31%
Total	**2,000**	

Table 2.4: Proportions applied to non-home-based accommodation headline worker numbers by zone

Location by zone	Non-home-based accommodation (worker numbers by zone)	Non-home-based accommodation (approximate proportion by zone)
North and East	1,323	44%
Holyhead	475	16%
Rest of Anglesey	762	25%
Mainland Zone 1	258	9%
Mainland Zone 2	182	6%
Total	**3,000**	

Following the undertaking of this process, a full profile of headline worker numbers operating per typical weekday was provided, as specified by both accommodation type and location.

Prior to assigning worker numbers by vehicle mode, it was important to consider the patterns of worker travel. Although headline worker numbers were provided for construction workers operating over a typical weekday, further assumptions had to be applied to calculate headline numbers representing:

- those operating a standard working day and commute pattern;
- those working weekends ('weekend workers'); and
- those commuting home over the weekend, from non-home-based accommodation and Site Campus.

As all these categories involved applying alternative routings, input numbers and assumptions, it was necessary to break down the information relating to each trip types separately and understanding the nature of commute is pertinent to the application of further assumptions provided by Horizon. Section 1.1.1 considers how headline worker numbers would vary by nature of commute, before discussing how vehicles numbers have been disaggregated in Sections 1.1.1 to 2.5.2 of this chapter.

9.1.1 Nature of worker commute

As discussed in Section 2.5.1, headline worker numbers for the construction staff vary by day.

The Strategic Traffic Model considers worker numbers for both 'weekday' and 'weekend' workers, whereby:

- weekday workers are representative of working patterns for a 'typical' weekday, applicable to construction staff typically working Monday to Thursday. The headline worker numbers provided by Horizon are representative of weekday workers; and
- weekend workers are representative of working patterns for staff working on a weekend. Horizon has specified that weekend work would occur from Friday to Sunday. During this period, it is assumed that 50% of workers would be able to travel home each weekend. However, due to the distance to their permanent home, it is expected that a lower proportion of staff will actually undertake the journey each weekend, resulting in an average of 34% of workers returning home each weekend.

Based on the assumptions above, model inputs have used headline worker numbers provided by Horizon to represent staff movements by accommodation type and location for staff working from Monday to Thursday (i.e. weekday workers). Model inputs use 50% of the headline worker numbers provide by Horizon to represent staff movements by accommodation type and location for staff working from Friday to Sunday (i.e. weekend workers). There would be some staff who are on leave, but would not travel home, however their leisure activities and associated travel movements have not been captured within the traffic model.

For those staff associated with the weekend effect, model inputs also capture traffic movements for those commuting to their place of permanent residence from Site Campus or non-home-based accommodation over the weekend. This movement of staff is referred to throughout as the 'weekend effect'. It should be noted that the weekend effect does not apply to commuters travelling from home-based accommodation, as it is assumed home-based staff travel from/to their place of origin on a daily basis.

It has been assumed that a weekend effect of vehicle movements should be applied, representative of staff leaving their accommodation on Thursday evening, to commute back to their place of permanent residence. Staff are assumed to return from their place of origin to their accommodation on Sunday evening.

Therefore, weekend effect workers represent commuters who travel to/from their 'place of origin' over the weekend period. Place of origin essentially refers to the workers' place of permanent residency outside of their living arrangements during the Power Station construction period. Places of origin are broken down by locations including Ireland, Rest of Wales, England, Scotland and Europe. This process also sufficiently captures assumptions associated with weekend effect commutes to Ireland (via Holyhead), which use different routing assumptions than all other weekend effect trips. Data processing has been designed to capture the granularity for these elements of the traffic model.

Horizon provided the proportion of commuters assumed to commute home over the weekend, as based on accommodation type and location. Table 2.5 captures the proportion of commuters by location and accommodation type, anticipated to commute home over the weekend.

Table 2.5: Proportion of staff subject to the weekend effect

Accommodation type and location	Proportion of commuters
Site Campus:	41%
Non-home-based workers: North and East	69%
Non-home-based workers: Holyhead	50%
Non-home-based workers: Rest of Anglesey	60%
Non-home-based workers: Mainland Zone 1	92%
Non-home-based workers: Mainland Zone 2	69%

The proportions detailed in Table 2.5 were applied to headline numbers provided by Horizon in relation to the specific location, to define the number of staff calculated to commute to their place of permanent residence on Thursday to return to Site Campus/ non-home-based accommodation on Sunday.

Following the process of defining headline worker numbers by location, accommodation type and nature of commute, the number of vehicles by mode could be calculated.

2.5.2. Calculating the number of vehicles by mode

This section of the report defines how the headline worker numbers have been divided into the number of vehicles by mode. The text below outlines the vehicle modes used by workers for commuting during the construction period. These include:

- large bus: staff travelling from accommodation to the WNDA development via a large bus;
- medium bus: staff travelling from accommodation to the WNDA development via a medium bus;
- minibus: staff travelling from accommodation to the WNDA development via minibus;
- car and bus (car): staff travelling from accommodation to the Park and Ride via personal car to park at the Park and Ride;
- car and bus (bus): staff travelling from the Park and Ride to the WNDA development by bus; and
- car direct: staff travelling from accommodation to the WNDA development directly by personal car.

The process of generating vehicles by mode involves a two-step process. Headline worker numbers are proportioned into the number of workers by mode, from which the exact number of vehicles can be calculated as specific to each commuting area within the Daily Commuting Zone. The use of specific vehicle mode proportions differs depending on the site from which the worker commutes, and the purpose for which the worker is travelling (e.g. commuting to work/commuting to place of origin). The process used to undertake these calculations is explained in more detail below.

Horizon provided the 'Worker Travel' spreadsheet. This spreadsheet provides a calculation of the worker travel by different modes, from different origins, to the Site Campus from their permanent home and all workers on their daily commute to the WNDA development. This is based upon an assessment of different zones across Anglesey and mainland Wales to reflect the travel patterns of different locations.

Proportions captured in the 'Worker Travel' spreadsheet have been multiplied by the profile of headline worker numbers for each location, generating the monthly profile of workers commuting by each mode for each location. Due to the varying nature in trips for those commuting to work and those commuting to their place of origin, two different sets of proportions were used. Table 2.6 and Table 2.7 highlight the proportions of headline worker number by each location that commute by a specific mode. It should be noted that it has not been necessary to define proportions by accommodation, as vehicle mode is specific to location, rather than accommodation type. It is therefore assumed that both home-based and non-home-based commuters would use the same proportions as defined by location.

A number of overarching assumptions have been adopted in the derivation of particular vehicular numbers by mode and the associated proportion of workers anticipated to align to particular modes of transport. These are summarised below:

- The Park and Ride would accommodate up to 1,900 car parking spaces.
- Car trips to/from the Park and Ride is assumed to reflect a car occupancy of two workers.
- There would be up to 1,890 car parking spaces at the Wylfa Newydd Development Area.
- The Site Campus would accommodate up to 4,000 construction workers. However, this has been aligned to a gradual increase in demand, starting at 1,000 workers by quarter 3 of 2019. From quarter 4 2020 to quarter 1 2022, 1,500 construction workers would be accommodated. From quarter 2 2022 to quarter 2 2022, 3,000 construction workers would be accommodated, and in quarter 4 2022, 3,500 workers would be accommodated. The maximum of 4,000 construction workers would be accommodated from quarter 1of 2023 until quarter 1 of 2026.

Table 2.6: WNDA development construction workers

	WNDA development construction workers					
Zone	Large bus	Medium bus	Minibus	Car and bus (car)	Car and bus (bus)	Car direct
Site Campus						
North and East		60%		0%	0%	40%
Holyhead	60%			10%	10%	30%
Rest of Anglesey				60%	60%	40%
Mainland Zone 1	60%			20%	20%	20%
Mainland Zone 2				58%	58%	43%

Table 2.7: WNDA development construction workers: weekend effect

	WNDA development construction workers: weekday and weekend workers					
Zone	Large bus	Medium bus	Minibus	Car and bus (car)	Car and bus (bus)	Car direct
Site Campus	53%			26%	26%	21%
North and East		41%				59%
Holyhead	53%					47%
Rest of Anglesey		40%				60%
Mainland Zone 1	34%					66%
Mainland Zone 2						60%

Following the profiling of workers by mode, it was important to capture further variables associated with worker numbers at this stage. This primarily concerned the process by which calculations were applied to ensure that no 'whole person' would be divided between a shift, and that subsequent calculations to determine the number of vehicles by mode would provide enough vehicles to transport 'whole' worker numbers. It was assumed that there were three daytime and three evening shifts for both weekday and weekend workers; similarly, weekend effect commuters were staggered over three commute windows (further information is provided in Section 3).

Following this calculation, the number of workers travelling by vehicle mode could be calculated, as based on occupancy of vehicles which varied by the nature of the commute. Table 2.8 shows the maximum occupancy assumed for each vehicle mode. It was assumed that each vehicle would reach a capacity of maximum occupancy, and therefore workers by mode were divided into vehicles based on maximum occupancy values. To ensure accuracy, 'round up' calculations were applied to ensure that whole worker/vehicle numbers were generated.

Table 2.8: Vehicle occupancy

	Large bus	Medium bus	Minibus	Car and bus (Car)	Car and bus (bus)	Car direct
Occupancy: Weekday/weekend	50	32		1.5	50	3
Occupancy: Weekend effect workers	50	32		1.5	50	1.5

The process of inputting vehicle numbers into the model also needed to account for the number of trips as specific to each vehicle mode and commute. Table 2.9 and Table 2.10 shows the number of trips (as defined by factors of multiplication) associated with each vehicle mode for the weekday and weekend worker and the weekend effect.

Table 2.9: Factors for return trips for weekday and weekend workers

Vehicle Mode	Factor	Comment
Bus (large)	4	Trip to parked location for shift start then to layover during shift, duplicated at shift end
Bus (medium)	4	Trip to parked location for shift start then to layover during shift, duplicated at shift end
Minibus	2	Trip to parked location and return journey
Car and bus (car)	2	Trip to parked location and return journey
Car and bus (bus)	4	Trip to parked location for shift start then to layover during shift, duplicated at shift end
Car direct	2	Trip to parked location and return journey

Table 2.9 shows the factors associated with return trips for those working during the weekday and weekend. These factors are based on the assumptions outlined below:

- for bus (large), bus (medium) and car and bus(bus): it is assumed that return vehicle movements would be equivalent to four-way trips between workers' accommodation and the Power Station. This value is representative of two return journeys. One return journey is assumed to represent the bus travel from the accommodation location to the Power Station; the bus then returns to the accommodation location for a layover period. This process is repeated at the start and end of a shift; and

- for minibus, car and bus(car) and car: it is assumed that return vehicle movements would be equivalent to a single two-way trip between the workers' accommodation and Park and Ride/Power Station, depending on the nature of the vehicle commute.

Table 2.10: Factors for return trips for weekend effect

Vehicle Mode	Factor	Comment
Bus (large)	2	Assumes half of daily commute due to nature of trip
Bus (medium)	2	Assumes half of daily commute due to nature of trip
Minibus	1	Assumes half of daily commute due to nature of trip
Car and bus (car)	1	Assumes half of daily commute due to nature of trip
Car and bus (bus)	2	Assumes half of daily commute due to nature of trip
Car direct	1	Assumes half of daily commute due to nature of trip

Table 2.10 shows the factors associated with return trips for weekend effect commuters. These factors are based on the assumptions outlined below:

- for bus (large), bus (medium) and car us (bus): it is assumed that return vehicle movements would be equivalent to one two-way trip. This value is representative of a drop-off trip from workers' accommodation to the destination for the weekend effect commute (for example a railway station for onward travel); the vehicle is then assumed to return to the workers' accommodation. This two-way movement is anticipated to occur for staff returning home on Thursday, and again for the pick-up of staff returning to work on Sunday.
- for minibus, car and bus (car) and car: it is assumed that vehicle movements for car will be equivalent to a single one-way trip. This assumes generic trip movements, whereby the vehicle leaves workers' accommodation site travelling to the place of origin on a Thursday (trip one per day), where the vehicle then returns from place of origin to workers' accommodation site on a Sunday (trip one per day).

Following the disaggregation of vehicles by mode, as specific to the varying commuter travel patterns, it has also been necessary to agglomerate vehicles specific to days of the week, as these are split into separate headline inputs and routing proportions in the model structure. The vehicle movements that apply to specific days of the week are outlined below:

- Monday to Wednesday: only consider traffic operating on a weekday;
- Thursday: consider traffic operating on a weekday and the weekend effect of workers travelling home after the end of the shift;
- Friday to Saturday: only consider vehicles of staff working over the weekend; and
- Sunday: consider vehicle movements of staff working over the weekend and weekend effect of workers returning to the highway network on Sunday.

The disaggregation of input values for the purpose of inputting into the model have therefore been broken down as follows:

- by location;
- by accommodation type;
- by commuter zone/location;
- by trip type;
- by vehicle mode; and
- by day of the week.

The model has been developed in such a way that the structure can accurately capture any variation in any of these inputs, providing an appropriately detailed level of granularity on which to assess Wylfa Newydd Project-related activity.

2.6. Stage 1: Operation Staff– Power Station and Associated Development

2.6.1. Introduction: Operation Staff– WNDA development and Associated Development

The WNDA development and Associated Development operation staff includes staff required to operate:

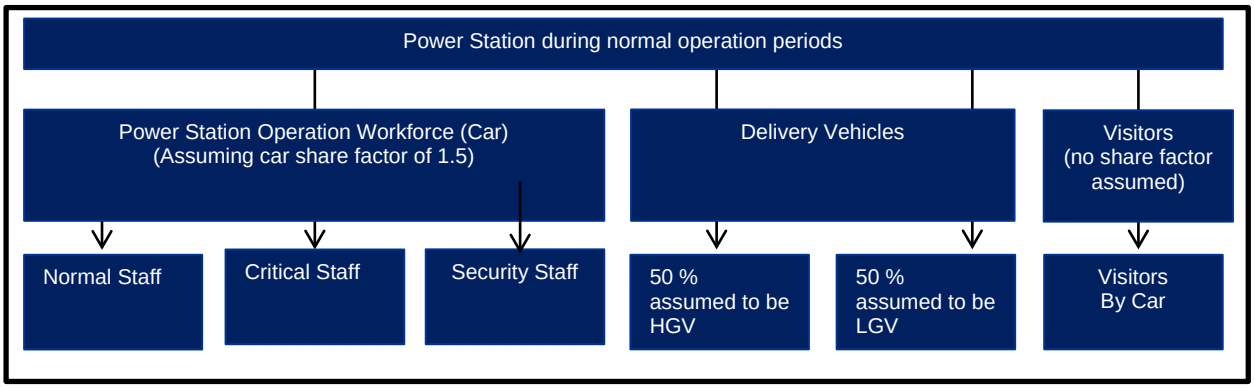
- the WNDA development during 'normal' operation periods;
- the WNDA development during periods of outage;
- the supporting Off-Site Power Station Facilities (i.e. the MEEG/AECC/ESL facilities); and
- the Associated Development during their operation to support the WNDA development construction.

Headline worker numbers required for the operation of the WNDA development, supporting Off-Site Power Station Facilities and various Associated Development sites were provided by representatives at Horizon. Due to the way in which numbers for operational staff, different methodologies and assumptions were applied to disaggregate vehicles per mode, this is highlighted below.

2.6.2. Power Station during normal operation periods;

Firstly, headline worker profiles were provided for staff working at the WNDA development during normal operation periods. Figure 2.7 shows vehicle classifications associated with normal operation to include car, delivery vehicles and visitors. To sufficiently capture assumptions related to routings and shift times of staff travelling by car, modes are disaggregated further into normal staff, shift workers or 'critical staff', and security staff. Similarly, vehicle numbers associated with delivery vehicles were broken down by HGV and LGV vehicle modes. Assumptions used to calculate the vehicle numbers for model inputting are outlined in full below.

Figure 2.7: Summary of operational staff, visitors and deliveries



For the operation of the WNDA development, it is assumed that the maximum number of normal staff on-site at any given period of operation is 665 staff. Vehicle numbers representing this number of staff has been calculated, assuming a car share factor of 1.5. During the day shift, this figure includes 50% of the total security staff (80 staff = total 40 staff day shift) and critical shift staff (100 staff = total 50 staff day shift), who operate a dual shift-pattern between 0700 to 1900 and 1900 to 0700.

It is outlined that the maximum headcount at any one time of the operational workforce is equivalent to 755 staff. All staff movements for Main Site Operation use the same profile, and for the purpose of model inputting use the above assumptions to calculate the proportion of the total operational staff attributed to normal staff, critical staff and security staff for the period of April 2018 to December 2036. Operational staff working a night shift have been assumed to reflect half of the critical shift staff (50 staff) and half of the security staff (40 staff).

For delivery/servicing vehicles associated with WNDA development operation, it has been assumed 50% of vehicles would represent HGVs and the remaining 50% would represent LGVs.

Vehicles associated with visitors have been provided by Horizon, with no assumptions related to car share. Therefore, no additional car share assumptions have been applied.

2.6.3. WNDA development during periods of outage

The timeline and associated workers that would operate during periods of outage have been provided by Horizon. It has been assumed that all workers operating during periods of outage would travel by car and assume a car share of 1.5 passengers per vehicle.

2.6.4. Supporting Off-Site Power Station Facilities (i.e. the MEEG/AECC/ESL facilities)

The timeline and associated vehicle numbers that operated at the MEEG/AECC/ESL facilities have been provided by Horizon. No detailed assumptions were provided in relation to these numbers, and so the vehicle numbers and timelines provided by Horizon were input directly into the model.

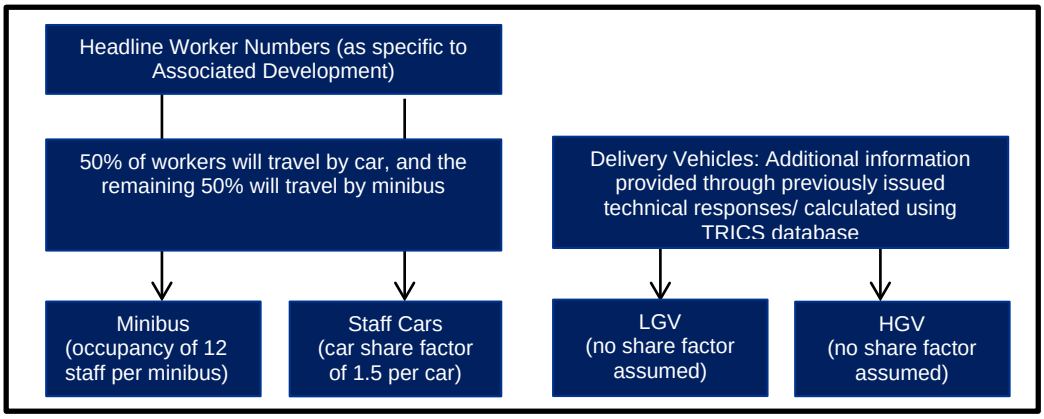
2.6.5. Associated Development operational workers

The staff required for the operation of Associated Development and facilities management are required for the operation of the following elements of the Wylfa Newydd Project:

- Site Campus;
- Park and Ride; and
- Logistics Centre.

Headline worker numbers have been provided by Horizon for facilities management staff for the elements of the Wylfa Newydd Project referred to above. Figure 2.8 shows vehicle modes for each element to include cars, minibus, LGV and HGV. Assumptions used to calculate the vehicle numbers for model inputting are outlined in full below.

Figure 2.8: Vehicle modes for facilities management staff



Only minor calculations were required to generate the vehicle numbers for facilities management staff from the headline worker numbers. It has been assumed that 50% of workers would travel by car, and 50% would travel by minibus. This has been applied to the headline worker numbers provided for each element. Once headline worker numbers were halved by mode, a car share factor of 1.5 was applied to those workers traveling by car, and a minibus occupancy factor of 12 was applied to those travelling by minibus.

For the Park and Ride and Logistics Centre, operational staff movements associated with HGVs and LGVs were also provided in Technical Responses provided by Horizon. These values were used to inform the amount of delivery vehicles associated with each site during operation. However, for delivery vehicles associated with Site Campus, the Trip Rate Information Computer System (TRICS) database was utilised to calculate the amount of Other Goods Vehicles (OGVs) associated with a development in line with the parameters and nature of the Site Campus. TRICS represents an industry standard tool for generating trip rates and associated trip generation for various land use types and therefore this was considered the most robust approach to defining delivery vehicles, and was in line with methodology used in previous versions of the model. TRICS outputs were derived through selecting trip rates associated with a 4,000-bed hotel, and of the parameters outlined on TRICS this was considered the most applicable to the Site Campus use.

Table 2.11 shows the TRICS outputs generated for a 24-hour period for a hotel used to inform delivery movements associated with Site Campus..

This also assumed that of the OGV values generated in the TRICS database should be proportioned in such a way that 95% of the total OGV numbers were representative of LGVs, and 5% of the total OGV numbers were representative of HGVs.

Table 2.11: TRICS outputs for LGV and HGV at Site Campus (as based on trips associated with 4,000 bed hotel)

	Arrivals		Departures		Total	
Time range	Trip rate	No. of trips	Trip rate	No. of trips	Trip rate	No. of trips
00:00-01:00	0	0	0	0	0	0
01:00-02:00	0	0	0	0	0	0
02:00-03:00	0	0	0	0	0	0
03:00-04:00	0	0	0	0	0	0
04:00-05:00	0	0	0	0	0	0
05:00-06:00	0	0	0	0	0	0
06:00-07:00	0	0	0	0	0	0
07:00-08:00	0.002	8	0	0	0.002	8
08:00-09:00	0.002	8	0.003	12	0.005	20
09:00-10:00	0.008	32	0.003	12	0.011	44
10:00-11:00	0.005	20	0.006	24	0.011	44
11:00-12:00	0.002	8	0.005	20	0.007	28
12:00-13:00	0.002	8	0.003	12	0.005	20
13:00-14:00	0.002	8	0.002	8	0.004	16
14:00-15:00	0.002	8	0.002	8	0.004	16
15:00-16:00	0.002	8	0.002	8	0.004	16
16:00-17:00	0.002	8	0.002	8	0.004	16
17:00-18:00	0	0	0	0	0	0
18:00-19:00	0	0	0	0	0	0
19:00-20:00	0.002	8	0	0	0.002	8
20:00-21:00	0	0	0	0	0	0
21:00-22:00	0	0	0	0	0	0
22:00-23:00	0	0	0	0	0	0
23:00-24:00	0	0	0	0	0	0
24hr	0.031	**124**	0.028	**112**	0.059	**236**

3. Stage 2: Profiling Vehicle Numbers

3.1. Vehicle profiling methodology

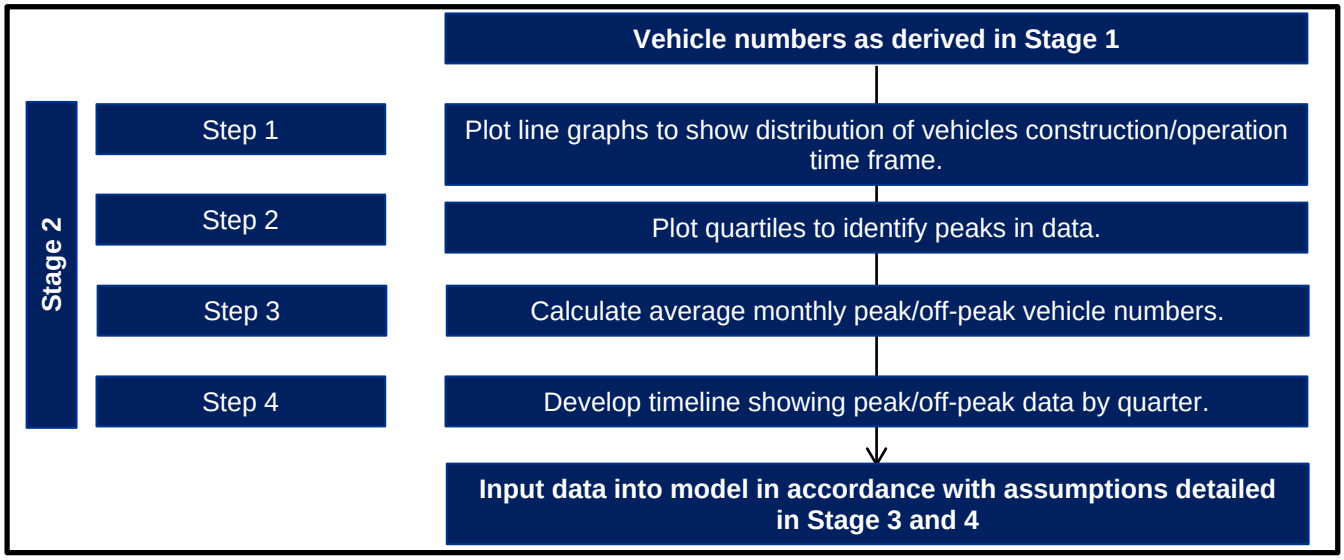
Following the derivation of vehicle numbers using the steps and assumptions identified in the previous chapter, headline vehicle numbers have been profiled to provide input values that directly align with the structure of the Traffic Model.

As referenced earlier, the Traffic Model has been structured in such a way that it can accurately represent different input components as they vary over time. This has predominantly been achieved by using peak and off-peak averages of data by quarterly time frames (please refer to Stage 3/Stage 4 and the Strategic Traffic Model Method Report for further detail on the model structure and functionality).

It is therefore necessary to identify average peak/off-peak vehicle input figures for each component across specified time frames for each element.

The key assumptions and process of profiling data to obtain this information are outlined below, with accompanying diagrams to help support the explanation of the profiling process for each step. Figure 3.3 provides an overview of these steps.

Figure 3.3: Overview of steps in stage 2



3.1.1. Step 1: Plotting line graphs

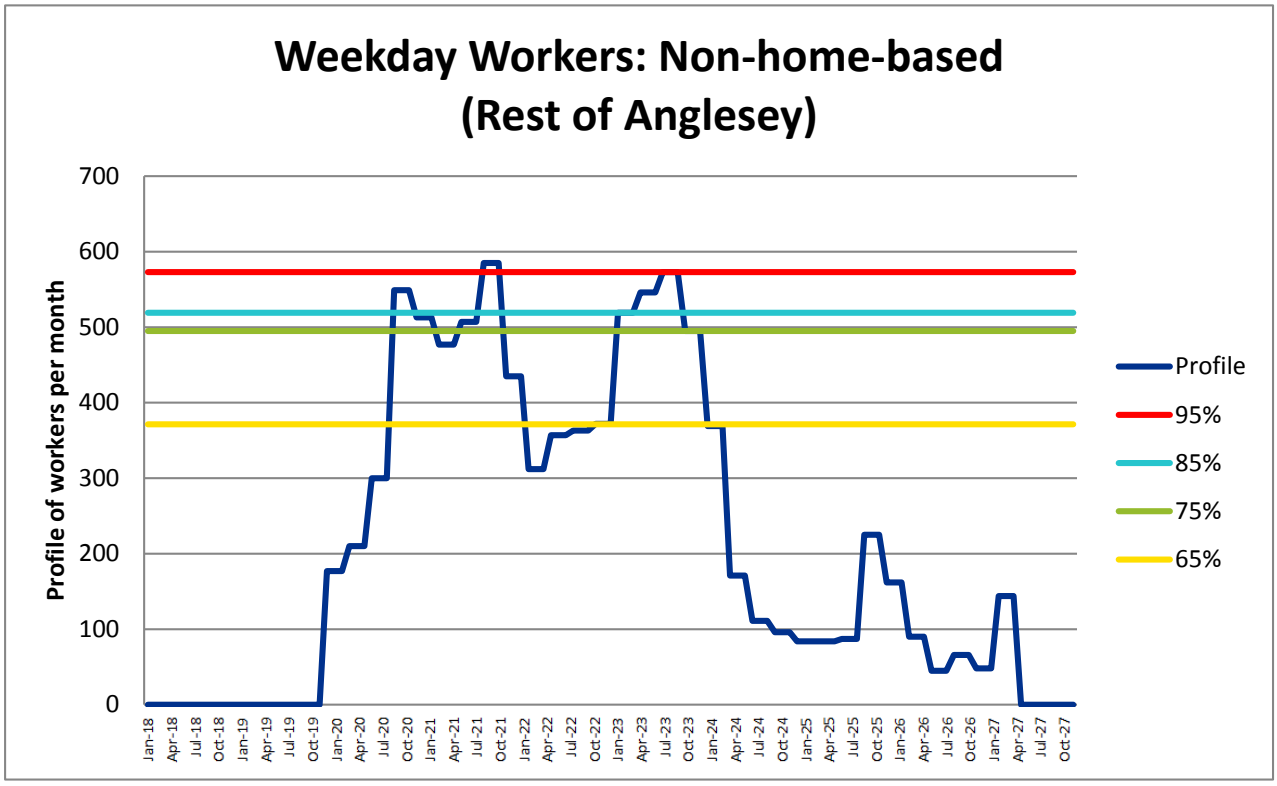
Line graphs form the basis from which peak/off-peak input values have been identified for the various components of each element. Graphs have been used to show the monthly distribution of vehicles for each element/component, based on the activity of each element/component over the full construction period. In instances where profiles have varied by mode, graphs have been disaggregated by modal distribution. For vehicle profiles related to elements such as the construction of the WNDA development, all vehicle modes were profiled from the same headline distributions, and would therefore take a variation of the same profile for every mode. In these instances, it is not necessary to profile the modal granularity of data.

3.1.2. Step 2: Identifying peaks in data

After each graph is plotted, the 95th, 85th, 75th and 65th percentiles of the dataset have been added to the graphs. Each percentile was represented by a single line, intersecting the distribution of monthly vehicle totals. Percentiles were used as a visual reference to identify peaks within the distribution of data. In the majority of instances, the obvious peak in data was defined by the 65th percentile. The method of plotting percentiles as a visual reference reduced the subjectivity of manually selecting peaks from a data series, yet escaped the rigidity of using mathematical selection such as standard deviations, which had previously skewed results. This approach was therefore considered to add consistency to the methodology through basing the identification of peaks on percentiles of data.

Figure 3.4 provides an example of how percentiles of data were used to help identify peaks in the profile of vehicle distribution. In this instance, the percentile selected to best capture peak distribution of the total vehicle numbers would be the 65th percentile. This method was considered the most appropriate way of ensuring the model was furnished with data that provided Annual Average Daily (AADT) Traffic and Annual Average Weekly Traffic (AAWT) with an appropriate degree of accuracy; whilst also appropriately representing the worst case periods as an output.. This logic was consistently applied throughout the analysis of each element.

Figure 3.4: Percentiles in weekday workers: non-home-based (Rest of Anglesey) vehicle profile



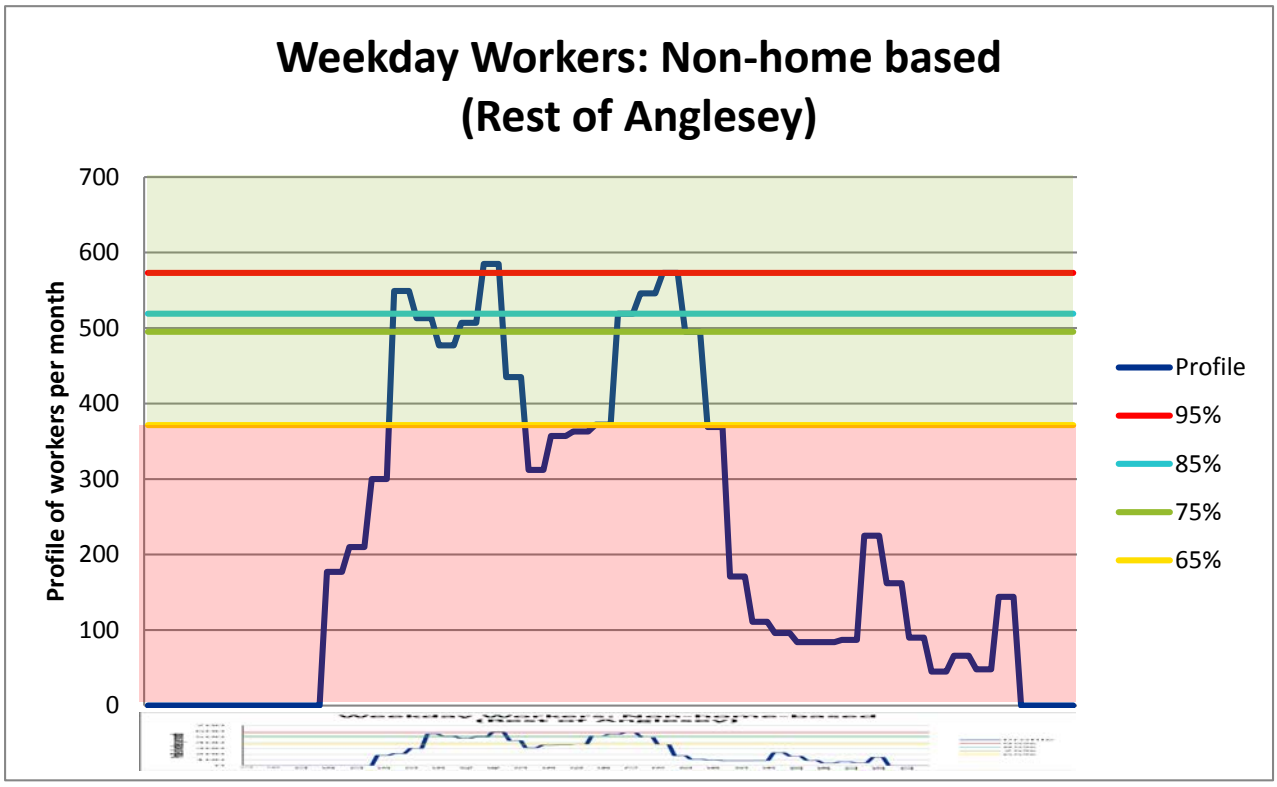
3.1.3. Step 3: Use of percentiles to calculate average peak/off-peak data

Following the identification of percentiles for each graph, it was assumed that all data captured above the linear percentile would be used to calculate the average peak data input values for the model, whilst all data captured below the percentile would be used to calculate the average off-peak data values.

Average peaks were calculated through summing all peak data and dividing this value by the amount of months in which the peaks were identified, i.e. representing the average monthly peak value of data. The same process was repeated with off-peak values to calculate the average monthly off-peak value for data.

Figure 3.5 shows how peak and off-peak data is divided for weekend workers; non-home-based (Rest of Anglesey), from which the average monthly peak/off-peak values can be calculated. Values used to calculate the average peak are highlighted in green, whereas values used to calculate the average off-peak are highlighted in red.

Figure 3.5: Average peak/off-peak in weekday workers: non-home-based (Rest of Anglesey) vehicle profile



For the above example, it was identified that 33 weeks of the operational timeline represented peak vehicle operation and 60 weeks of the operational timeline represented off-peak weeks. The vehicle modes that fell within each peak/off-peak period were then summed and averaged between peak/off-peak weeks. For example, there were a total of 4,311 direct cars operating in peak weeks, meaning the average peak direct car value was equal to 131 direct cars (4,311 total peak direct car movements/33 weeks). Alternatively, there were a total of 3,618 direct cars operating in off-peak weeks, meaning the average off-peak direct car value was equal to 61 direct cars (3,618 total peak direct car movements/61 weeks).

The numbers generated then form the peak and off-peak values for inputting into the model by vehicle mode, which then assigns the specified number of peak and off-peak weeks according to the calculated level of activity in any given quarter. So in the example above, the average peak value would be applied to 33 weeks across the construction period for those weeks that have been identified to fall within the peak percentile.

3.1.4. Step 4: Aggregation of data to inform Traffic Model inputs

Once the average monthly peak/off-peak values for each vehicular mode associated with each element have been identified, data are profiled in a timeline showing the relating peak/off-peak headline modal vehicle numbers for each element/component. The timeline has been designed in Excel, and is the primary source of information used to populate Traffic Model inputs. Using this method allows the many variables in the construction process to be accurately captured, ensuring that specific data for a particular point in time are accurate as well as accurate calculations of annual average data.

The construction timeline extends from January 2018 to December 2035, allowing all developments to be captured on the same timeline. The timeline has been populated dependent on the months in which vehicles of

a given element operated. For each operational month, it was stated whether vehicle numbers were representative of peak or off-peak average monthly values and how many weeks within a quarter a calculated peak or off-peak value should be applied.

Information on the timeline would be used to numerically inform the timelines of Traffic Model inputs, designed to reflect the exact proportion of months within the year that were represented by peak or off-peak vehicle numbers. In order to accurately produce these monthly proportions, it was important to account for the varying days for each month, as the model has been designed to produce AADT and AAWT outputs, which may have been inaccurate had vehicular inputs been equally proportioned by 12 (i.e. the 12 months in a year).

Table 3.12 shows how months have been broken down numerically, quantified by days per month and weeks per month, which have been used to determine the number of peak/off-peak in the model per quarter by year.

Table 3.12: Numeric breakdown of months by days per month and weeks per month

Month	Days per month	Weeks per month
January	31	4.43
February	28	4.00
March	31	4.43
April	30	4.29
May	31	4.43
June	30	4.29
July	31	4.43
August	31	4.43
September	30	4.29
October	31	4.43
November	30	4.29
December	31	4.43

Traffic Model inputs have been designed to aggregate vehicle profiling into annual quarters, as opposed to months. By using quarters to represent data, specific attributes of data were still accurately captured in inputs (e.g. vehicle seasonality, shift working), and could be processed and reflected more efficiently.

Quarters were split evenly across the 12 months of each year, whereby:

- quarter 1 represented January, February and March;
- quarter 2 represented April, May and June;
- quarter 3 represented July, August and September; and
- quarter 4 represented October, November and December.

As stated, Traffic Model inputs require numeric representations of data. It was decided that this was best quantified in weeks per quarter. Table 3.13 demonstrates the numeric values of weeks per quarter, essentially derived from summing information for each month detailed in Table 3.12.

Table 3.13: Numeric breakdown quarters by weeks per quarter

Quarter	Month	Average days	Total days	Average weeks	Weeks per quarter
1	January	30	90	4.285714	12.85714
	February				
	March				
2	April	30.33333	91	4.333333	13
	May				
	June				
3	July	30.66667	92	4.380952	13.14286
	August				
	September				
4	October	30.66667	92	4.380952	13.14286
	November				
	December				

To facilitate Traffic Model input, each quarter was broken down to represent the amount of peak/off-peak vehicle movements by week. For example, if a site had peak vehicle movements in January and March, and off-peak vehicle movements in February:

- 8.86 weeks of quarter 1 would represent average peak vehicle numbers; and
- 4.00 weeks of quarter 1 would represent average off-peak vehicle numbers.

This logic formed the basis of all the Traffic Model input values calculated using the steps/stages identified in this report for each element of the Wylfa Newydd Project.

As well as capturing input data variations, the model has been designed to capture further attributes of data (for example vehicle routings and shift staggers). The assumption and process for accommodating such information into the Traffic Model is considered in Stage 3 and Stage 4.

It should be noted that in the instance of the model inputting for staff associated with the WNDA development operation, the above methodology and peak and off-peak values were not considered an appropriate method of input. This was due to the standardised profile of daily operation associated with the data. In this instance, numbers representing the WNDA development workforce were input directly in accordance with the information provided by Horizon.

4. Stage 3: Traffic Model Data Input Assumptions

4.1. Introduction

This chapter provides an overview of the general principles and specific assumptions that have been used when furnishing the Traffic Model with the input data outlined in Figure 1.1. A number of the general principles are applied consistently to all input parameters, whilst some specific assumptions have been made relating to particular input data associated with a specific activity, where this information has not been provided.

4.2. Vehicle Routing Assignment

The most common and widely applied assumption relates to the way in which traffic is assigned to routes within the model. The entire model structure has been developed in 30-minute time periods, so all 24 hours of a day are represented in the model by 48 individual time periods.

Additionally, the model is provided with a total of 1,450 routes, which cover all possible origin and destination pairs identified in the geographical coverage of the model. These routes are coded using the various turning movements at junctions that are located along a route and form part of the base data included within the model. When a route is identified, and traffic is assigned to a route, vehicle movements are assigned to each turning movement at all the junctions that make up a particular route for the relevant 30-minute time periods.

The application of assigning traffic demand in half hour time periods allows for a more detailed understanding of the vehicle movements at different locations, which is an important consideration given the wide coverage of the model and the journey times that some of the routes involves. Consideration of smaller time periods mitigates against possible double counting of vehicle movements at different locations due to over-simplification of using longer time frames.

During the coding of all 1,450 routes in the model, on-line journey planning tools have been used to establish the average travel time for undertaking each route from start to finish. This journey time informed how input data were split across a route within the model. In the majority of cases, due to the extent of the coverage of the model including a number of internal roads on Anglesey, journey time to complete most origin and destinations associated with routes on Anglesey can be completed within 30 minutes. Therefore, the input data associated with a particular activity could be assigned to a route and included within one distinct 30-minute time period in the model. In some cases, however, the total journey time exceeded 30 minutes. This typically involved routes originating in areas to the east of Llangefni and any destinations in the vicinity of the WNDA development. In these instances, a breakpoint at Valley has been used to split journeys into two separate 30-minute periods.

The use of Valley as a breakpoint ensures that there is sufficient coverage for the entire island/mainland to enable all journeys to be assigned to appropriate 30-minute time periods by route.

The use of breakpoints allows journeys greater than 30 minutes in duration to be split across two half hourly time periods. For example, a journey from Bangor on the mainland to the Wylfa Newydd Development Area is identified to take approximately 45 minutes. Therefore, for this journey, the demand has been split such that the traffic on the first part of the route (i.e. Bangor to Valley) would be assigned to the 07:00 to 07:30 period and Valley to Wylfa Newydd Development Area would be assigned to the 07:30 to 08:00 period, for example.

Traffic demand is applied to specific routes and time periods in the model using proportions that link to the total traffic by mode, associated with particular activities. This ensures that the correct proportion of traffic is applied by route and by time period whilst also allowing for the use of the breakpoint system.

This highlights how the use of breakpoints ensures that demand is only applied to certain turning movements on particular sections of road at specific times, and is not being double counted elsewhere on the network in the same period. This is a vital feature in being able to provide accurate hourly outputs at different locations as well as calculate accurate AADT and AAWT outputs.

4.3. Journey Timing

The way in which demand has been assigned to routes in terms of timings has also been consistently applied across all input data in the model. In all instances, it has been assumed that journeys would be undertaken in the 30-minute period preceding or after a specific activity start or end time.

For example, if a shift start time is specified as 08:00, then demand associated with that shift would be assigned to the 07:30 to 08:00 time period, or the 07:00 to 07:30 and 07:30 to 08:00 time periods, if the journey is anticipated to be longer than 30 minutes.

This assumption has been applied consistently across all inputs and across all modes, including the application of the weekend effect and the multi-modal journeys associated with the Park and Ride. A number of specific assumptions have been also been incorporated relating to the weekend effect journey timings which are outlined in further detail in Section 6.4.

5. Committed Developments

5.1. Introduction

As identified in the supporting Strategic Traffic Model Method Statement Report, a total of eight committed developments have been identified and included in the model. Jacobs has used the information provided in publicly available planning documents associated with each committed development, or specific information included in Technical Responses where available, to capture the traffic impacts of each in the model. This has been applied to the appropriate years in which activity is forecast to occur to ensure that the accuracy of future reference case traffic flows.

It should be noted however, that the coverage of the Traffic Model is much larger than the area of interest identified in the individual assessments and documents supporting specific committed developments. Therefore, it has been necessary for Jacobs to incorporate a number of additional assumptions to ensure committed developments are included in the Strategic Traffic Model in a sensible manner that does not result in 'lumpy' data across the network.

The remainder of this Section will outline the specific assumptions that have been identified for each committed development to enable their inclusion in the model.

5.2. Existing Power Station Decommissioning

Jacobs has used a combination of information provided in t by Horizon, as well as information included within the 2013 Environmental Statement that has been made available addressing impacts associated with the decommissioning of the Existing Power Station.

5.2.1. Operational staff shift edit

Technical information provided by Horizon states that staff working as part of the operation of the Existing Power Station worked on a standard shift of 08:00 to 16:30. The Existing Power Station was operational in 2014 and 2015, when the traffic count surveys underpinning the Traffic Model were commissioned. Therefore, traffic movements associated with operational staff of the Existing Power Station are captured within the base data included in the model.

Technical information provided by Horizon states that the staff required for decommissioning of the Existing Power Station will work a different shift pattern of 07:30 to 18:00. Therefore, in order to accommodate this change and remove the existing staff captured in the traffic count data, staff trips have been altered in the model to reflect the new decommissioning shift. This has been achieved by deducting vehicle movements associated with the time periods preceding and after the operation shift time and included in the correct 30-minute periods to reflect the new decommissioning shift start and end time. The effect of this shift edit will only be seen in specific hours; the overall calculated AADT would remain consistent.

Technical information provided by Horizon states that typical staff numbers operating the Existing Power Station on a standard shift reflected 340 staff, plus contractors and a small number of security staff. The shift edit, for the identified number of staff, has been applied to the main shift workers.

5.2.2. Decommissioning staff numbers

The reason for implementing the shift edit described above is due to the fact that the total number of decommissioning staff is forecast to reduce over time. Therefore, the shift edit was necessary to ensure that this reduction in staff is applied to traffic in the correct time periods. Forecast decommissioning staff numbers for the Existing Power Station are outlined in the 2013 Environmental Statement, as summarised in Table 5.14 below. This reduction has been reflected in the relevant year in the model. The Environmental Statement highlights that the main decommissioning activities are forecast to begin in 2017. Decommissioning staff numbers have only been specified up to 2025; therefore, it has been assumed all decommissioning activities will cease at this point and no further allowance has been made for decommissioning activities beyond 2025 in the model.

Based on the standard operating staff number of 340 (the traffic impacts of which are already captured in the traffic count data), Jacobs has applied an appropriate change of staff numbers to each year relative to the proposed number of decommissioning staff, as outlined in Table 5.14, for the new shift timings.

Table 5.14: Existing Power Station decommissioning staff numbers

Year	Decommissioning Staff	Change Applied
2017	375	+35
2018	353	+13
2019	280	-60
2020	250	-90
2021	230	-110
2022	220	-120
2023	210	-130
2024	220	-140
2025	175	-165
2026 onwards	0	-340

5.2.3. Contractor staff

In addition to decommissioning staff, the Environmental Statement also identifies that decommissioning the Existing Power Station will also require use of a number of contractor staff. Technical information provided by Horizon state that the Existing Power Station employed 100 contractor staff, whilst the decommissioning activities would require the use of 150 contractor staff up to 2025. Therefore, the additional 50 contractor staff have been applied to the model (on the assumption that traffic movements associated with the 100 contractors associated with the Existing Power Station operation are already captured within the traffic count data). The same shift edit has also been applied to contractor staff to reflect the different shift patterns between operation and decommissioning activities, with the additional 50 contractor staff also applied to the revised time periods reflecting the new shift time.

5.2.4. Decommissioning staff and contractor distribution

Technical information provided by Horizon states that the vast majority of decommissioning activities can be undertaken by existing operational staff with transferrable skills. Therefore, technical information provided by Horizon in relation to the origin/residence of operational staff has been used to inform the distribution of the decommissioning staff and contractors. This is outlined in Table 5.15 below.

Table 5.15: Existing Power Station Decommissioning Staff Distribution

Location	Proportion
Holyhead	26.2%
Amlwch	24.3%
Llannerch-y-medd	3.9%
Cemaes	8.7%
Penysarn	3.9%
Benllech	4.9%
Llangefni	5.8%
Menai Bridge	5.8%
Llanfairpwllgwyngyll	5.8%
Bangor	3.9%
Caernarfon	2.9%
Conwy	2.9%
Blaenau Ffestiniog	1.0%
	100.0%

5.2.5. HGV profiling

The Environmental Statement specifies that up to 38 HGV trips per day would be generated through decommissioning activities during the main decommissioning phase to 2025. It does not provide a profile over the main decommissioning phase. Therefore, to ensure a worst-case assessment, it has been assumed 38 HGV trips per day will be generated throughout the main decommissioning phase. No information is provided post 2025, so it has been assumed no HGVs would be generated beyond this time.

In the absence of any specific information, all HGV trips have been assumed to operate over a 12-hour period of 07:00 to 19:00. This profile assumes an even distribution across the day.

Routings for decommissioning HGV trips have been assumed to use the main road network (A55 and A5025 west) and all have been HGVs assumed to route to and from the mainland. This assumes a breakdown of 90% to/from the A55 east beyond Llanfairfechan and 10% travelling along the A5 to/from Tregarth, within the geographical extent of the model.

5.3. Llanfaethlu School

Jacobs has sourced a Transport Assessment produced to support the proposed new school. It is understood that the proposed school will amalgamate a number of smaller existing schools in the area into one central facility. No information is provided in the document into a potential reduction in trips associated with the closure of existing school facilities; therefore, no allowance has been made for this in the Traffic Model.

The Transport Assessment states that the school would operate from 09:00 until 15:00 from 2017, with a total of 150 pupils and 16 staff. It also states that a breakfast and after-school club will operate at the school (08:00 to 09:00 and 15:00 to 16:00); however, no information is provided relating to the anticipated use of this club.

Therefore, it has been assumed that 50% of staff and pupils would arrive and depart an hour earlier and later to utilise the breakfast/after school club, with the remaining 50% of pupils and staff arriving and departing for the standard school day.

The Transport Assessment provides a breakdown of staff and pupil numbers and distribution based on postcode analysis. Jacobs has used this postcode analysis to group the spatial points into set routings to apply in the model. On this basis, the following breakdown of origins for pupils has been established:

- Llanfair-yng-Nghornwy – 32%
- Llanfachraeth – 31%
- Lon Las – 18%
- Llanfaethlu – 19%.

The following breakdown of origins for staff has been established:

- Valley – 40%
- Llanfachraeth – 30%
- Tregele – 15%
- Lon Las – 15%.

5.4. Land and Lakes Development

Jacobs has been provided with a Transport Assessment undertaken in 2011 for the Land and Lakes development. Although the Transport Assessment has information relating to three separate developments, namely development at Cae Glas, Kingsland and Penrhos, only the development at Penrhos is considered to represent a committed development likely to come forward in time. Therefore, only information relating to the proposed development at Penrhos has been included in the Traffic Model. This represents the development of leisure holiday lodges.

The Transport Assessment states Penrhos development construction will start in 2015/2016. On this basis, committed development traffic associated with Penrhos has been included in the model from 2016, which also represents the base year on which all future years in the model are pivoted from.

5.4.1. Construction

Detailed construction numbers are not provided in the Transport Assessment for the construction phases on development. Therefore, no allowance for the traffic impacts of construction vehicles associated with the Land and Lakes development is included in the model.

5.4.2. Operation

The information provided in the Transport Assessment is relatively limited in the context of the wider scope and coverage of the Traffic Model. The Transport Assessment provides peak hour movements associated with the Land and Lakes development and identifies the impacts at a small number of locations in the immediate vicinity of the development site.

The Traffic Model covers a much larger area, all 24 hours of a day, as well as calculating AADT and AAWT outputs. Therefore, only including the peak hour traffic information provided from the Transport Assessment at the reduced scale would potentially result in discrepancies across the network in the Traffic Model, both between the individual modelled hours as well as AADT and AAWT values in locations that either are or are not included in the Transport Assessment scope. It was also noted that limited supporting information was provided as part of the Transport Assessment to justify the trip rates that had been used in the assessment.

Table 5.16 below summarises the total two-way daily trip generation associated with the Land and Lakes development.

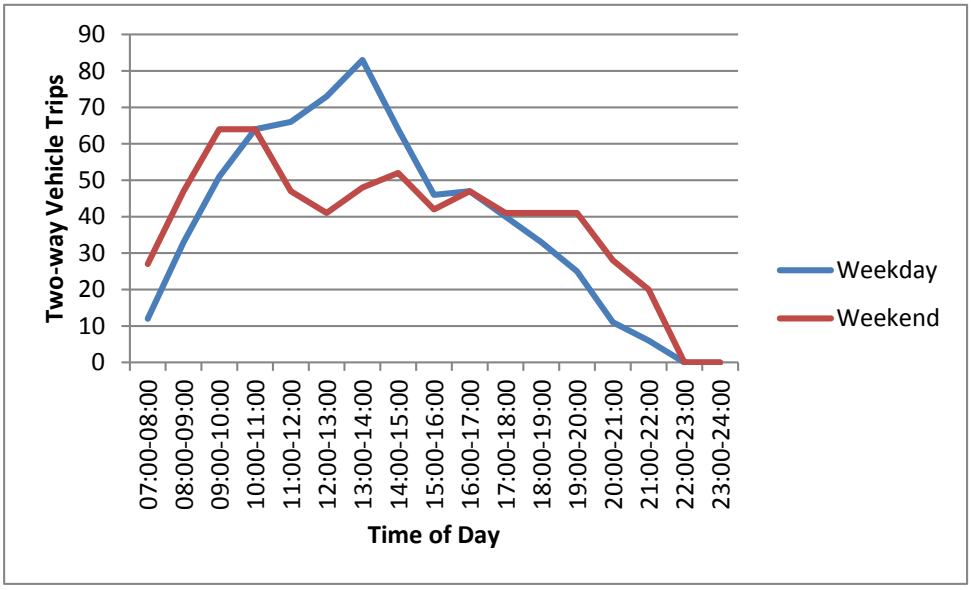
Table 5.16: Land and Lakes trip generation

Development	Total two-way daily trips	
	Monday– Friday	Saturday and Sunday
Penrhos Lodges	1,042	1,044

The Transport Assessment only provides single daily trip generation rates for the proposed holiday lodges. Jacobs has therefore interrogated the TRICS database to establish a profile from similar holiday lodge type developments on which to apply the daily trip generation total across a typical day.

Figure 5.6 provides a visual illustration of the daily trip profile that has been derived for lodges at Penrhos using the trip rates extracted from TRICS. This allows traffic activity over a full day to be fully captured in the Traffic Model rather than relying on the limited peak hour information provided in the Transport Assessment.

Figure 5.6: Traffic generation daily profile



5.4.3. Phasing

The Transport Assessment states that the construction period for the lodges at Penrhos would last approximately five years. A phased five-year build profile has therefore been assumed from 2016 for Penrhos, resulting in full operational capacity being realised by 2021.

The total two-way trip rates derived above have been factored accordingly (i.e. only 20% coming forward in construction year one and so on).

5.4.4. Distribution

The Transport Assessment states that 75% of traffic generated by the lodges at Penrhos is assumed to represent vehicles associated with guests arriving and departing (i.e. check-in/check-out). The remaining 25% is identified to be associated with leisure trips of guests during their stay at the lodges/hotel. This breakdown has been applied throughout the model.

Alternative distributions have been applied in the Transport Assessment to check in/check out trips and leisure trips.

In relation to check/check out trips, the Transport Assessment assumes that all trips route to/from the mainland. In order to distribute trips in line with the added detail included in the Traffic Model, the following breakdown of trips on the mainland has been assumed, reflecting the assumption that the majority would represent longer distance trips:

- A55 east (50%);
- A487 (25%); and
- A5 (25%).

Table 5.17 below provides a summary of the traffic distribution applied to leisure trips in the Transport Assessment.

Table 5.17: Land and Lakes Transport Assessment distribution

Route	Penrhos leisure distribution	
	Arrivals	Departures
A55 Holyhead	61%	57%
A5153	14%	19%
A5025 Valley North	9%	10%
B4545 Valley South	7%	5%
A55 Mainland	9%	9%

The Transport Assessment is limited in that it identifies traffic distribution to key routes (such as the A55 east or A5025 corridor); however, it does not specify the origin or destination of traffic assigned to these routes. Therefore, in order to ensure consistency in the model, the following origin/destination assumptions have been applied to key corridors.

Traffic associated with leisure uses and assigned to the A55 east have been assumed to distribute according to the following:

- 70% from local towns situated along the A55 east corridor (Llangefni, Llanfairpwllgwngyll, Menai Bridge and Bangor), weighted by population; and
- 30% assigned to the three routes on the mainland (using the breakdown outlined above). This assumes a larger proportion of leisure trips will be undertaken locally.

Traffic assigned to the A5025 north for both leisure trips and residential have been assumed to distribute based on the population weighting of the key settlements located on this corridor, namely Llanfachraeth, Llanfaethlu, Cemaes and Amlwch.

Residential traffic assigned to the A55 east corridor has been assumed to distribute to local towns accessible along the corridor, weighted by population (Llangefni, Llanfairpwllgwngyll, Menai Bridge and Bangor). Residential traffic is not assumed to originate or be destined for any locations beyond those specified due to the length of commute that such a journey would involve.

5.5. Rhyd-y-Groes Wind Farm

Information relating to this development has been sourced from the Environmental Statement supporting the planning application. The information has been broken down into the following key assumptions, relating to traffic volumes, vehicle classification and routings. In relation to predicted traffic volumes, the Environmental Statement assumes the following 12 month construction profile occurring in 2016.

Table 5.18: Wind Farm construction vehicle profile

Month/Vehicle numbers	1	2	3	4	5	6	7	8	9	10	11	12
HGVs	1,586	1,592	1,592	200	228	302	386	336	336	238	0	60
LGVs/car	440	660	660	660	660	660	660	660	660	440	440	440

5.5.1. Vehicle profiling

In order to ensure compatibility with the model, an average of total daily movements and HGV movements across each of the 13-week periods specified in the model have been calculated and applied to its respective quarter (i.e. average of month 1 to 3, 4 to 6 etc.). For LGVs and cars, the volumes are generally more consistent throughout the year; therefore, an average of all 12 months has been calculated and applied in the model.

The average monthly figures have then been divided by 22 to generate a model input value, to reflect the Monday to Friday and half day Saturday construction times that are specified in the Environmental Statement. Shift times for construction staff have been identified as 07:00 to 19:00 Monday to Friday and 07:00 to 13:00 on a Saturday. All traffic associated with the 12-month construction profile has been applied in 2016 in the model.

In terms of vehicle classification, no specific information is provided; therefore, HGVs have been split evenly between OGV1 and OGV2 in the model. Similarly, cars and LGVs have also been split evenly. It has been assumed that HGV deliveries will occur between 09:00 and 15:00.

Movements for turbines are specified within the Environmental Statement. These have been applied within a separate component as they have their own specific parameters; it has been assumed that the three turbine deliveries a day would occur at 09:00, 11:00 and 13:00. Turbine components have been specified as being delivered by sea; therefore, road transport of turbines has been assumed to occur from Holyhead.

5.5.2. Staff and HGV distribution

The Environmental Statement states that construction workers would stay locally. Therefore, the distribution established from the home-based workers from the Gravity Model has been applied. These distributions are discussed in more detail in Section 6.2 of this report .

The Environmental Statement specifies that HGVs will route from a location at Gwalchmai on the A5. A route has been created in the model for this purpose.

5.6. Llangefni Link Road

A Transport Assessment supporting the link road has been made available to Jacobs, from which traffic data relating to the construction period has been included in the Traffic Model. It should be noted that only traffic impacts relating to the construction activities have been included in the Traffic Model and no allowance has been made for the re-distributional operational impacts arising from the implementation of the link road. No information has been provided in relation to operational impacts, which would be expected to be relatively localised in any case, resulting in limited impact in the more extensive context of the Traffic Model.

The Transport Assessment highlights that the link road will be developed in four sections over a three-year construction period (2015 to 2018). The Transport Assessment provides a detailed breakdown of HGV and staff movements, by year and by section. It has been assumed that HGV trips included in the model will be split evenly between OGV1 and OGV2 vehicle classes.

A total of 40 staff will construct the link road, consistent throughout the construction period.

The data provided in the Transport Assessment have been considered in relation to the model structure, with peak and off-peak HGV values calculated based on the activity occurring in each quarter during the construction period. This information is summarised in Table 5.19 below and forms the model inputs.

Table 5.19: Link road construction traffic

Year	Daily HGVs peak	Daily HGVs off-peak
2015-2016	19	1
2016-2017	9	1
2017-2018	4	0

5.6.1. Distribution

Vehicle diagrams provided in the Transport Assessment have been used to derive the distribution of HGV trips. Some material is expected to be sourced from a local quarry near Amlwch (accounting for 18% of trips) with the remaining 72% being distributed to/from the mainland.

In terms of staff distribution, there is limited information in the Transport Assessment; therefore, it has been assumed that the majority of staff will represent local labour and therefore the home-based workers distribution from the Gravity Model has been applied. These distributions are discussed in more detail in Section 6.2 of this report .

5.7. Parc Cybi

Jacobs has been provided with a Transport Statement that summarises the proposed traffic movements associated with the Parc Cybi development. The Transport Statement specifically addresses the impacts of a proposed transport hub and truck stop with supporting ancillary office use. This facility is being developed on a parcel of land that already benefits from a wider extant permission for employment land covering the entire Parc Cybi site. The Transport Assessment also provides detail of the wider outline planning permission at Parc Cybi.

Relatively limited information is available beyond that included in the Transport Statement in terms of which sites within the Parc Cybi development area have come forward and the phasing of sites being brought to market. The Transport Statement identifies that the wider Parc Cybi development benefits from an extant outline planning permission for 24,500sqm of B1 office use, 45,464sqm of B1/B2 employment use and supporting hotel and crèche facilities.

It is understood the proposed transport hub/truck stop will replace 15,620sqm of B1/B2 extant permission. The Transport Statement provides arrival and departure information for the various elements of the scheme between 07:00 and 19:00. This profiling has been reflected in the corresponding hours of the Traffic Model. The ancillary office, management and maintenance elements represent additional trips; 101 two-way car vehicle trips per day and 89 two-way LGV trips per day. HGV traffic does not represent additional trips, as the proposed truck stop is intended to serve existing HGV traffic on the A55 and therefore the 264 two-way daily HGV trips will turn off the A55 to access the truck stop and then re-join the A55 to continue in the direction of travel.

These on/off manoeuvres have been captured within the Traffic Model by employing the appropriate positive and negative proportions to the affected route.

It is understood that some sites associated with the wider consent have been brought forward and are currently being marketed at Parc Cybi. This information is provided on the Parc Cybi website and highlights that of the remaining net outline extant permission, 2,782sqm of B1 office and 10,126sqm of B2 industrial units benefit from a full planning permission, representing Phase 1.

It has been assumed that the remaining sites benefitting from an extant outline planning permission represent later phases of development. This is also complicated by the fact that the Logistics Centre associated with the Wylfa Newydd Project is being proposed at Parc Cybi, on a large portion of the land that represents Phase 2 development benefitting from the outline permission. Therefore, for the purpose of the Traffic Model and the key assessment years being considered, the following assumptions have been made in relation to the quantum of development coming forward at Parc Cybi.

- Phase 1 of Parc Cybi (full planning permission) as well as proposed transport hub/truck stop assumed to be built out early and therefore reflected in 2020 and 2023 assessment years.
- Phase 2 cannot be built out due to the Logistics Centre; as a consequence, during the construction phase of the Power Station and operation of the Logistics Centre, only Phase 1 of Parc Cybi and truck stop would represent committed development. Logistics Centre traffic would be added over and above this committed development traffic.
- The Logistics Centre would be decommissioned following completion of the WNDA development construction phase at the end of 2027. Therefore, it is assumed that the wider Phase 2 committed development at Parc Cybi will then come forward. It has therefore been assumed that this wider development will come forward and be included in the 2033 assessment year.

Trip generation associated with all of these committed development scenarios have been established with reference to the trip rates defined for the various land uses in the Parc Cybi Transport Statement. Trip generation related to the Logistics Centre has been calculated based on the information provided directly by Horizon in relation to its intended use. Further information on these assumptions is provided in Section 6.3.

5.7.1. Distribution

The distribution associated with the HGVs and the proposed transport hub/truck stop is a simple diverge/merge manoeuvre on the A55, using the traffic proportions identified in the Transport Statement. The car and LGV traffic has been distributed according to the home-based workers distribution from the Gravity Model. These distributions are discussed in more detail in Section 6.2 of this report .

In relation to the wider office and industrial uses proposed at Parc Cybi, there is limited information in the Transport Statement. Therefore, it has been assumed that the majority of staff will represent local labour and therefore the home-based workers distribution from the Gravity Model has been applied. These distributions are discussed in more detail in Section 6.2 of this report .

5.8. Eco Park

5.8.1. Construction

A Transport Assessment detailing the construction and operational traffic impacts of the proposed Anglesey Eco Park has been interrogated by Jacobs. This development represents a biomass power plant with ancillary supporting office use.

Construction of the Eco Park is identified to occur over a two-year period; 2016 and 2017. The Transport Assessment highlights that construction staff will total a maximum of 200 staff throughout 2016, peaking at a maximum of 800 staff in the first quarter of 2017. This profiling has been accurately captured within the model.

HGV loads have been identified to route to/from the Port of Holyhead to the site. Limited information is provided in relation to construction staff; therefore, construction staff trips have been distributed according to the home-based workers distribution from the Gravity Model. These distributions are discussed in more detail in Section 6.2 of this report.

Construction staff shifts have been identified in the Transport Assessment, starting at 07:00 and a staggered end of time of 17:00, 18:00 and 19:00, with an even split assumed between the staggered shift end. These shift times have been accurately reflected in the model.

5.8.2. Operation

The Transport Assessment has provided detailed information in relation to anticipated staff numbers and shift timings during the operation of the Eco Park, which is expected to become operational from 2018.

Operational staff numbers will total 100 staff, of which 60 will be office-based staff commuting daily; working a 08:00 to 18:00 shift. The remaining 40 staff will represent control room and security staff associated with the biomass plant, working 12 hour shifts; 06:00 to 18:00. No information is provided in the Transport Assessment relating to the distribution of operational staff; therefore, it has been assumed that the home-based workers distribution from the Gravity Model will be the most applicable distribution profile to apply.

6. Stage 3: Additional Model Assumptions – Construction

6.1. Introduction

A key input into the modelling process has involved establishing the appropriate distribution profile to apply to particular construction related demand inputs to ensure the effect of this additional demand has been assigned to the correct roads/locations.

This section of the report details the assumptions that have been employed to ensure that trip generation is accurately assigned for the relevant activities. Trip generation for the construction of the Power Station is based upon vehicle loads for required construction materials; further information on HGV movements and construction material assumptions is provided in Section 6.3 below.

For the WNDA development construction workers, trip generation has been based on a maximum requirement of 9,000 workers during the peak of construction, with up to 4,000 of these workers located in Site Campus and 5,000 located in existing accommodation (in a variety of accommodation types) both on Anglesey and the mainland. The accommodation has been grouped into three key groups:

- home-based accommodation representing construction workers living locally on Anglesey and the immediate mainland who could therefore commute to the WNDA development (or other construction sites) from their permanent place of residency;
- non–home-based accommodation representing construction workers who do not have permanent residency in the area and reside temporarily during the construction period in existing accommodation within a commutable area of the WNDA development (such as sub-let, homestay or private rental accommodation); and
- Site Campus representing specific temporary accommodation blocks constructed at the WNDA development to accommodate up to 4,000 construction workers who do not have permanent residency in the area.

The maximum requirement of 9,000 workers as defined by Horizon during the peak of construction is considered to be representative of all staff required for main site construction, for the Associated Development and Off-Site Power Station Facilities that make up the Wylfa Newydd Project.

The distribution of workers has been based upon a worker distribution Gravity Model that has been the subject of consultation with the IACC and the Welsh Government. In order to ensure a consistent approach, where possible, Jacobs has derived distributions and applied these within the model based on the information provided in the Gravity Model.

6.2. Construction Gravity Model Routing Distributions

The Gravity Model assigns a proportional weighting to all wards located on Anglesey and the mainland, within the Daily Commuting Zone, for two main accommodation types:

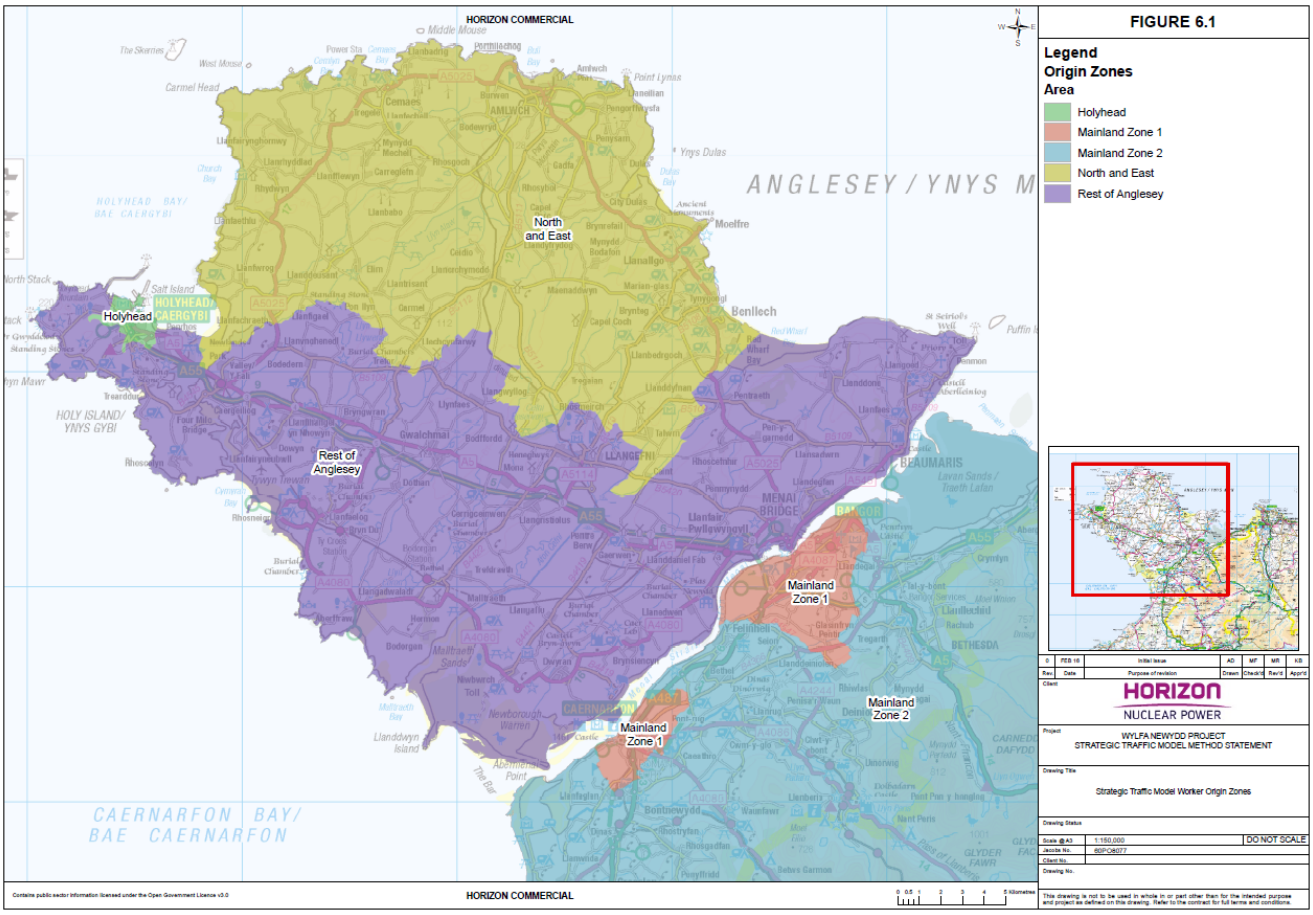
- home-based accommodation; and
- non-home-based accommodation.

The Gravity Model provides bespoke distributions based on the available population and bed space relating to each accommodation type in the areas defined within the Daily Commuting Zone. The proportional weightings established from the Gravity Model have therefore been used to determine the number of construction workers who would travel from particular areas, based on their accommodation type.

The specific assumptions related to construction workers being accommodated in Site Campus are summarised in Section 2.5 of this report. However, for the 5,000 staff residing in home-based or non-home-based accommodation on Anglesey and the mainland, a 50km Daily Commuting Zone has been established and categorised into the following key areas, as outlined in Figure 6.7.

- Holyhead;
- North and East;
- Rest of Anglesey;
- Mainland Zone 1 (representing Bangor and Caernarfon); and
- Mainland Zone 2 (representing all other areas of the mainland).

Figure 6.7: Worker Origin Locations (Daily Commuting Zone)



For each defined area, a specific distribution has been calculated based on the wards located within each area and their relative weighting according to the Gravity Model. This exercise has been undertaken for home-based and non-home-based accommodation in each area to allow for an accurate distribution by area and by accommodation type. In instances, home-based and non-home-based distributions were applied individually depending on the nature of a commute. For example, it was assumed that facilities management staff would solely use a home-based distribution given the nature of these job roles and the likely commute that would be considered appropriate for such roles. Whereas, the input data provided for the model has been disaggregated by accommodation type, non-home-based or home-based for each defined area. Therefore, for each area, the appropriate non-home-based or home-based distribution that has been calculated for each area has been applied to the WNDA development construction workers.

However, in the case of staff attributed to work over the construction period for the Associated Development, as highlighted in Section 2.2, a combined Gravity Model distribution has been used for the purpose of applying appropriate proportions in the model. This ensures compatibility with the format of the information provided by Horizon for these elements and the subsequent processes summarised in Stage 1 and 2 in previous sections of this report, and allows for combined total worker numbers to be distributed proportionally throughout the modelled network as specific to their commute.

In order to derive routing distributions for each area, the wards have been grouped and aligned with key settlements, which were based on the major towns in the study area, informing the proportional weighting applied to each route and key origin/destination location. The routings have been developed to originate or end at the centre of the main identified settlement, or the next available junction that traffic survey data is available for as the loading point onto the network.

A number of specific assumptions have been applied to the different areas identified above, to reflect both the different weightings in the Gravity Model but also some specific elements of the broader Transport Strategy that have been developed for the period of Main Construction. These are outlined in the sections below.

In all cases, the vehicle inputs have been aligned to reflect the wider shift timings provided to Jacobs. The Traffic Model reflects the following assumptions relating to construction worker shifts and is applied universally across home-based accommodation, non-home-based accommodation and the Site Campus and summarised in Table 6.20 below:

Table 6.20: Main Site construction shift patterns

Shift scenario	Shift timings	Shift split
Triple day shift/triple night shift (2020 onwards)	Day shift 07:00 – 17:00 07:30 – 17:30 08:00 – 18:00 Night shift 16:30 – 03:00 17:00 – 03:30 17:30 – 04:00	70/30 day/night shift split

In all cases where triple shift staggers are assumed, vehicle demand has been distributed evenly between the three shift staggers (i.e. for the 70% day shift, each shift represents 23.33% of staff). Construction staff for the main site have been assumed to work 7-days a week, albeit these quantum of staff varies over time; with the impact of staff leave and the weekend effect resulting in lower worker numbers being represented in the Traffic Model at weekends (Friday-Sunday).

A key element of App C2-4 Appendix F (Application Reference Number: 6.3.20)relates to achieving car sharing to reduce the impact of car trips associated with the Wylfa Newydd Project. Assumptions drawn from App C2-4 Appendix F (Application Reference Number: 6.3.20)relating to car share differ by journey type and area within the Daily Commute Zone. These assumptions have been applied to generate an appropriate quantum of car-based trips for staff from different areas, and can be summarised as follows:

- Car trips direct to Park and Ride: 1.5 passengers per vehicle; and
- Car trips direct to the Wylfa Newydd Development Area: 3 passengers per vehicle.

6.2.1. Holyhead

Construction staff workers located in Holyhead are assumed to reside in a combination of home-based and non-home-based accommodation types. In both cases, it is assumed that workers would travel to the Wylfa Newydd

Development Area directly by car. Additionally, buses would be provided to transport construction workers between their accommodation and the Wylfa Newydd Development Area. Therefore, based on the shift splits identified above, all construction staff located in Holyhead are assumed to travel to the site either directly by car or by bus. The breakdown by vehicle type for staff travel to/from Holyhead is 60% by bus, 10% by park and ride (car and bus) and 30% direct to Wylfa Newydd Development Area by car.

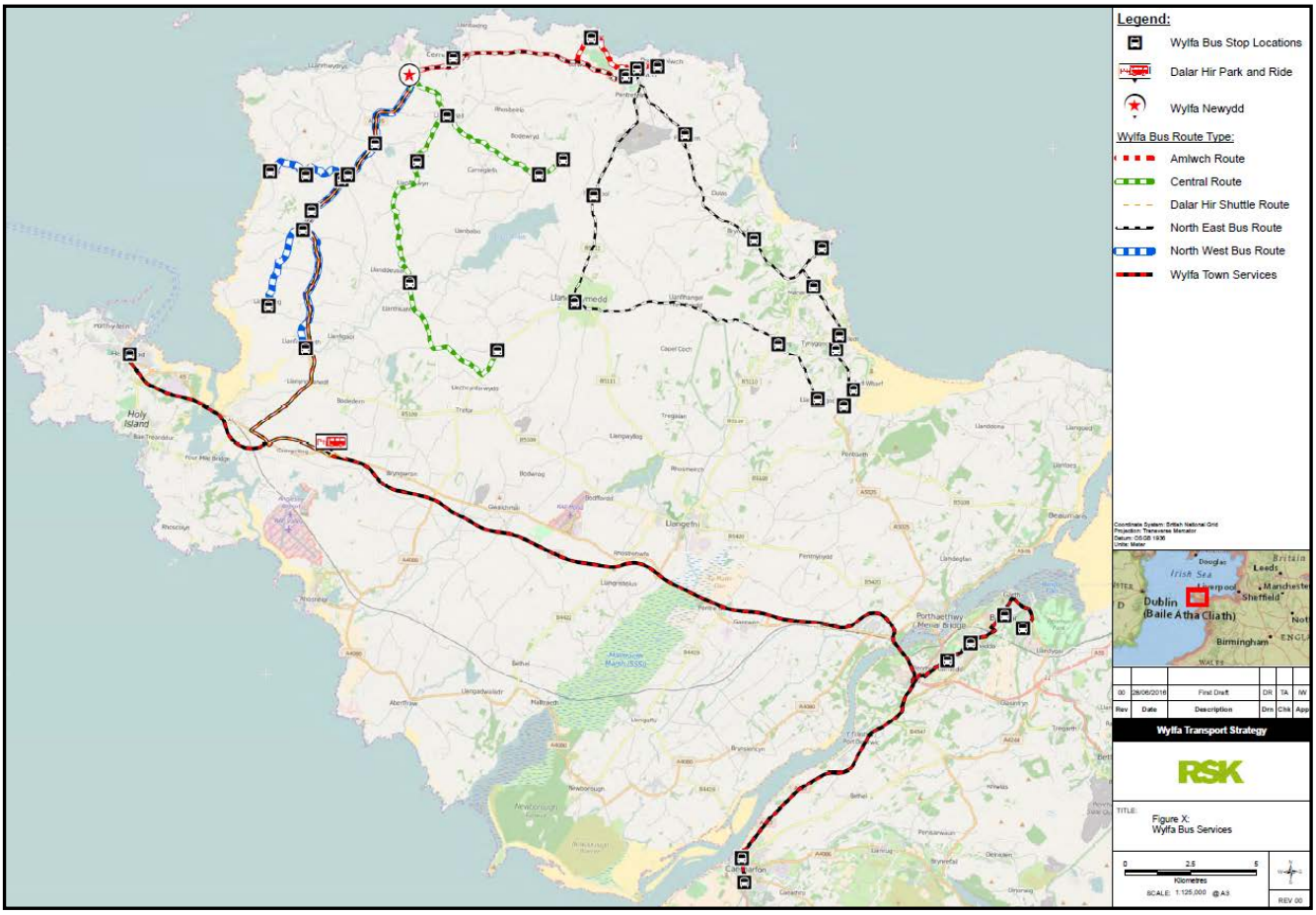
6.2.2. North and East

Construction workers located in the north and east of Anglesey are assumed to travel to site by a combination of by car (directly to the WNDA development) or by bus. Some construction workers are assumed to utilise a dedicated bus shuttle service to be provided by Horizon, to be implemented as part of the North and East Bus Strategy, as defined by RSK. This would apply to construction workers residing in both home-based and non-home-based accommodation. There is limited information available at present as to how the North and East Bus Strategy would operate; however, for the purpose of the Traffic Model, it is assumed that the strategy involves the provision of seven separate bus routes covering the North and East area, as summarised below and identified in Figure 6.8. This information has been provided to Jacobs by RSK. The routes considered include:

- central route;
- north-western (westerly route);
- north-western (south-western route);
- north-western (southern route);
- north-eastern (western route);
- north-eastern (eastern route); and
- Amlwch route.

In order to assign a proportionate number of staff and associated bus demand to each route, Jacobs has used the information provided in Figure 6.8 to determine how many bus stop/waiting facilities are located within each ward located in the north and east area.

Figure 6.8: Wylfa Newydd Project bus strategy (plot provided by RSK)



This has allowed a proportion to be assigned to each route, weighted by the worker population/bed availability of the wards identified in the Gravity Model that each route passes through and the number of bus stops/waiting facilities to be located in each. These calculated proportions are summarised in Table 6.21 below.

Table 6.21: North and East bus route distributions

	Central route		North-west route			North-east route		Amlwch route
	Southern route	Eastern route	Western route	South-western route	Southern route	Western route	Eastern route	
Home-based accommodation	10%	4%	9%	8%	2%	6%	14%	48%
Non-home-based accommodation	6%	3%	9%	9%	2%	8%	29%	34%

The routes specified in the model have also been coded to accurately represent where a number of routes converge at specific points on the network, such as the various routes of the north-west route converging on the A5025, thereby ensuring that the cumulative demand associated with all three routes in this example are correctly assigned to the network.

This process has been undertaken for both home-based and non-home-based accommodation in the north and east area, with an appropriate number of vehicles (buses) assigned to each route on this basis by accommodation type. Additionally, this process is compatible with the proportion-based structure used in the model to assign traffic to routes, thereby allowing the appropriate volume of buses to be assigned to the routes based on staggered shift timings.

The routings established for buses have been created specifically to represent the various routes associated with the North & East Bus Strategy, visualised in **Error! Reference source not found.**. Routes relating to car trips between the North & East area and the site have been created separately based on the combined home-based and non-home-based Gravity Model distribution proportions. This is summarised in Table 6.22 below.

Table 6.22: North and East worker distribution (by car)

Origin/destination	Combined home-based/non-home-based distribution proportion
Amlwch	30.1%
Benllech	16.0%
Cemaes	26.9%
Llanfachraeth	11.5%
Llannerch-y-medd	2.4%
Moelfre	13.1%
	100.0%

6.2.3. Rest of Anglesey

Construction workers located in the Rest of Anglesey area have been assumed to utilise the Park and Ride to access the Wylfa Newydd Development Area, both for home-based and non-home-based accommodation. In addition, a number of construction workers located in the Rest of Anglesey area have also been assumed to travel directly to the Wylfa Newydd Development Area by car.

The Park and Ride forms part of the wider transport strategy for the Wylfa Newydd Project, alongside transporting staff by bus/minibus directly to site and the Site Campus.

Jacobs has identified the wards that are located in the Rest of Anglesey defined area. The worker population/bed availability for home-based and non-home-based accommodation types has been sourced from the Gravity Model and proportions by ward calculated. The wards have then been grouped and associated with a specific origin (e.g. Valley). The calculated proportion for each origin/area then informs the routes that traffic is assigned to in the Traffic Model.

Table 6.23 below summarises the proportions assigned to each origin/area based on the methodology identified above.

Table 6.23: Rest of Anglesey worker distribution

Origin/destination	Home-based and Non-home-based distribution proportion
Rhosneigr	11.0%
Benllech	9.9%
Llannerch-y-medd	11.0%
Llanfairpwllgwngyll	6.4%
Llangefni	10.6%
Valley	27.6%
Gaerwen	9.4%
Menai Bridge	14.3%
	100.0%

The headline percentage figures summarised above have been disaggregated by the relevant day/night shift proportions for the different shift patterns proposed according to the shift start and end times and applied to the total daily traffic generation. This then ensures the correct proportion of traffic has been assigned to the correct route by shift and by time period within a day. The distribution profile above has been applied to cars travelling directly to the Wylfa Newydd Development Area as well as cars routing to the Park and Ride.

The vehicle trip generation associated with the Park and Ride is made up of both car-based traffic (i.e. workers driving to/from the Park and Ride) as described above and then buses shuttling between the Park and Ride and the Wylfa Newydd Development Area to transport construction workers to the site.

It has been assumed that all bus movements (both direct buses to the Wylfa Newydd Development Area and bus shuttles between the Park and Ride and the Wylfa Newydd Development Area) would involve a return trip with no layover. Additionally, a worst-case scenario has been modelled in that there has been no allowance for optimisation of bus trips between shifts (i.e. it has been assumed that an empty bus will travel from the Park and Ride to pick up staff ending the day shift). The same bus has not been assumed to be used to transport staff from the Park and Ride to the Wylfa Newydd Development Area for start of a night shift where there are shift crossovers.

In terms of timings, car-based trips to the Park and Ride and then bus shuttles between the Park and Ride and the Wylfa Newydd Development Area have been assumed to occur in different half hour time periods in the model. For example, if a shift start is 08:00, the car-based trip to the Park and Ride has been assigned to the 07:00 to 07:30 time period, with the subsequent bus shuttle between the Park and Ride and Wylfa Newydd Development Area assigned to the 07:30 to 08:00 time period. No layover period has been assumed and therefore the empty bus shuttle has been assumed to return back to the Park and Ride in the 08:00 to 08:30 time period.

6.2.4. Mainland Zone 1

Construction workers located on the mainland in Mainland Zone 1 have been identified as those workers residing in either Bangor or Caernarfon. These workers have been assumed to utilise the Park and Ride to access the Wylfa Newydd Development Area, both for home-based and non-home-based accommodation. In addition, a number of construction workers located in Mainland Zone 1 have also been assumed to travel directly to the site by car as well as travel directly to the site by bus.

The same process described previously has also been applied to Mainland Zone 1. Jacobs has identified the wards that are located in these defined areas. The worker population/bed availability for home-based and non-home-based accommodation types has been sourced from the Gravity Model and proportions by ward calculated. The wards have then been grouped and associated with a specific origin (either Bangor or Caernarfon). The calculated proportion for each origin/area then informs the routes that traffic is assigned to in the Traffic Model for each accommodation type.

Table 6.24 below summarises the proportions assigned to each origin/area based on the methodology identified above.

Table 6.24: Mainland Zones 1 and 2 worker distribution (all modes)

Origin/destination	Mainland Zone 1
	Home-based distribution proportion and non-home-based distribution proportion
A487 Caernarfon	35.9%
Bangor (via A55 Junction 9)	16.0%
Bangor (via A55 Junction 10)	48.1%
	100%

There are considered to be three main routes between Bangor on the mainland and Anglesey. These involve either:

- Menai Crossing;
- Junction 9 of the A55; or
- Junction 10 of the A55.

Jacobs has considered the most direct routes (by travel time) between all Middle Super Output Areas that make up the urban area of Bangor and identified the fastest route by travel time according to online mapping tools. This analysis highlighted that it was unlikely there would be any trips made via the Menai Crossing, 25% of trips would route via the A55 Junction 9 and 75% of trips would route via the A55 Junction 10. This breakdown has been reflected in the analysis provided in Table 6.24 above.

The headline percentage figures summarised above have been disaggregated by the relevant day/night shift proportions for the different shift patterns proposed, according to the shift start and end times and applied to the total daily traffic generation. This then ensures the correct proportion of traffic has been assigned to the correct route by shift and by time period within a day.

In addition to car-based traffic associated with the Park and Ride, a number of construction workers located in Bangor and Caernarfon in Mainland Zone 1 have been assumed to be transported to the Wylfa Newydd Development Area by minibus. This assumption forms part of the Wylfa Newydd Project Bus Strategy as outlined in Figure 6.8 and shows specific town services associated with Bangor and Caernarfon.

A similar calculation has been undertaken as described previously to determine an appropriate distribution on the mainland for workers residing in home-based and non-home-based accommodation to be transported by minibus. The wards captured within the defined Mainland Zone 1 area that are associated with Bangor and Caernarfon have been identified, and their weighted proportions calculated based on the worker population/bed availability from the Gravity Model. These proportions have then been assigned to a route (the A55/Bangor and the A487) that are captured in the Traffic Model to route an appropriate number of minibuses to/from each town to reflect the number of home-based or non-home-based construction workers located in each.

The proportions assigned to each origin/area based on the methodology identified above have been applied to all trips within Mainland Zone 1 (car direct, bus direct and park and ride trips).

6.2.5. Mainland Zone 2

A number of construction workers located on the mainland in Mainland Zone 2 (i.e. all other areas within the Daily Commuting Zone outside of Bangor and Caernarfon) have been identified as also commuting to/from the Wylfa Newydd Development Area. All of these workers have been assumed to travel to the site by car, either directly to the site itself or utilising the Park and Ride to access the Wylfa Newydd Development Area, both for home-based and non-home-based accommodation.

The same process described previously has also been applied to Mainland Zone 2. Jacobs has identified the wards that are located in these defined areas. The worker population/bed availability for home-based and non-home-based accommodation types has been sourced from the Gravity Model and proportions by ward calculated. The wards have then been grouped and associated with a specific origin. The calculated proportion for each origin/area then informs the routes that traffic is assigned to in the Traffic Model for each accommodation type.

Many of the locations identified in Mainland Zone 2 are located outside of the extent and coverage of the Traffic Model. Therefore, for the purpose of Mainland Zone 2, rather than identifying routes by specific settlements, wards have been grouped according to the three main transport corridors that are included in the Traffic Model for the mainland.

Table 6.25 below summarises the proportions assigned to each origin/area based on the methodology identified above.

Table 6.25 : Mainland Zone 2 worker distribution (by car)

Origin/destination	Mainland Zone 2
	Home-based distribution proportion and non-home-based distribution proportion
A487	27.9%
A5	17.2%
A55	54.9%
	100.0%

As would be expected given the spatial distribution of settlements on the mainland, the majority of construction staff travelling to/from Mainland Zone 2 would do so via the A55 corridor.

6.2.6. Management staff

During construction of the WNDA development, Horizon has highlighted that a number of specialist management staff would also be required. The management staff have been included within the 9,000 construction worker total. They are captured within the proportion of staff from various areas identified to travel directly to/from the Wylfa Newydd Development Area throughout the construction period, with sufficient on-site car parking being provided to accommodate management staff demand.

Information provided by Horizon details the peak number of management staff differs across the timescale of operation of the Power Station and Associated Development. Information has been provided to suggest management staff numbers would vary over the construction period; therefore, Jacobs has assumed that all 500 management staff would be in place for the full Main Construction phase, from 2018 to the end of 2027.

6.2.7. Associated Development and Off-Site Power Station Facilities construction staff

The Wylfa Newydd Project encompasses a number of Associated Development and Off-Site Power Station Facilities that would support the construction programme for the Power Station. These facilities would generally be constructed in the early part of the construction period, prior to the peak in activity associated with the construction of the Power Station.

The same combined home-based and non-home-based distribution derived from the Gravity Model has been used for the purpose of Associated Development and Off-Site Power Station Facilities construction worker distribution. However, instead of applying bespoke distribution profiles between different commuting zones, a distribution for the entire Daily Commuting Zone has been calculated. This is due to the fact that Associated Development and Off-Site Power Station Facilities construction workers are not included within the overarching worker accommodation and transport strategy that has informed the vehicle modes and trip types generated for specific commuting zones that have been summarised above. The full home-based and non-home-based Daily Commuting Zone distribution profile has been applied to the following:

- Park and Ride;
- Logistics Centre;
- Site Campus;
- MEEG and AECC/ESL; and
- A5025 On-line and Off-line Highway Improvements.

Table 6.26 below summarises the home-based distribution derived from the Gravity Model for the Daily Commuting Zone.

Table 6.26: Distribution for Associated Development and Off-Site Power Station Facilities (Daily Commuting Zone)

Origin/destination	Distribution proportion
Amlwch	11.5%
Benllech	8.2%
Cemaes	10.3%
Gaerwen	1.9%
Holyhead	17.4%
Llannerch-y-medd	3.2%
Llanfachraeth	4.4%
Llanfairpwllgwyngyll	1.3%
Llangefni	3.3%
Menai Bridge	2.9%
Moelfre	3.9%
Rhosneigr	2.3%
Valley	5.7%
Mainland (A55 east)	9.1%
Mainland (A5)	2.9%
Mainland (A487)	7.0%
Mainland (Bangor A55 Junction 9)	1.2%
Mainland (Bangor A55 Junction 10)	3.5%
	100.0%

As highlighted, this distribution profile assumes that the majority of construction workers would be located on Anglesey, with around 25% of workers expected to route to/from the mainland over Britannia Bridge.

A general assumption applied to all Associated Development and Off-Site Power Station Facilities construction relates to 50% of workers on-site being transport to site by minibus from various locations in the Daily Commuting Zone. Based on an assumed minibus capacity of 12, the mode split that has been applied in the model for construction staff associated with Associated Development and Off-Site Power Station Facilities reflects:

- 74% of construction traffic reflecting car trips; and
- 26% reflecting minibuses (classified as LGVs in the Traffic Model).

All Associated Development and Off-Site Power Station Facilities construction activities have been assumed to occur on a standard shift; representing 08:00 to 17:30. This shift pattern and working arrangement has been assumed to occur seven days a week during construction activities.

6.2.8. Associated Development and Off-Site Power Station Facilities construction (HGVs and LGVs)

HGV trips associated with the construction of Associated Development and Off-Site Power Station Facilities have also been applied with consistent assumptions across the various activities. An assumption consistently applied for all Associated Development and Off-Site Power Station Facilities construction is that all HGV have been assigned to route to/from the mainland. The following breakdown has been applied to available routes identified in the Traffic Model on the mainland east of Britannia Bridge for all Associated Development and Off-Site Power Station Facilities:

- A55 east (Llanfairfechan) – 45%;
- A487 (Caernarfon) – 25%;
- A5 (Tregarth) – 5%; and
- A55 (Bangor) – 25% (split 25/75 between A55 Junction 9 and A55 Junction 10).

This breakdown is considered to reflect that fact that some standard building materials would be sourced locally, via Bangor and Caernarfon; however, the majority of specific building materials would come from locations further afield via the A55. All HGV trips relating to Associated Development and Off-Site Power Station Facilities construction have been assumed to represent 25% OGV1 and 75% OGV2 vehicle classes.

As a proportion of total HGV and LGV traffic associated with Associated Development and Off-Site Power Station Facilities construction, LGVs generally represent around 50% of all traffic across the elements of the Wylfa Newydd Project that represent Associated Development and Off-Site Power Station Facilities. The remaining proportion of HGV traffic has been assigned to OGV1 and OGV2 vehicle classes on a 25% and 75% weighting respectively.

HGV and LGV deliveries relating to Associated Development and Off-Site Power Station Facilities have been assumed to occur Monday to Friday during the hours of 09:00 and 15:00 along the A5025 north of Valley to avoid peak hours and the start and end of the school day. Only HGV deliveries impacting on the A5025 have been restricted to a six-hour delivery window. However, this has only been assumed if construction activity is scheduled to occur prior to the opening of the A5025 bypasses in 2020. Following the bypass opening, HGV deliveries have been assumed to occur over a 12-hour delivery window between 07:00 and 19:00. Any construction activity that does not result in HGV traffic routing via the A5025, such as the Logistics Centre and Park and Ride, is assumed to occur over an unrestricted 12-hour delivery window irrespective of the A5025 Highway Improvements being implemented as this traffic would not impact on the A5025.

HGVs associated with the A5025 On-line and Off-line Highway Improvements have been assumed to occur seven days a week. More detail is provided in relation to HGV traffic and delivery timings in Section 6.3.

6.2.9. Associated Development and Off-Site Power Station Facilities construction visitors

For all Associated Development and Off-Site Power Station Facilities construction, a number of visitors have been assumed to route to each site during their construction. The number of vehicles varies in each case, and the methodology for generating these vehicle numbers has been summarised in Section 2.1 of this report.

A consistent assumption has been applied to all Associated Development and Off-Site Power Station Facilities reflecting that for each site, visitors would route to/from the mainland. The mainland distribution has been based on the inbound/outbound vehicle totals on the A5, A487, A55 and from Bangor. These figures have been generated using the survey flows included in the Jacobs' Britannia Bridge VISSIM Model (App C2-4 DCO TA Appendix I – VISSIM Model Results (Application Reference Number: 6.3.23)). In the absence of any specific information in relation to visitors and their likely routings, establishing a distribution based on observed traffic volumes on key links on the mainland is considered more appropriate than a Gravity Model-based distribution based on workforce/bed space criteria.

Table 6.27 below summarises the distribution derived VISSIM Model that has been applied to all Associated Development and Off-Site Power Station Facilities construction visitor trips.

Table 6.27: Distribution for visitors (Associated Development and Off-Site Power Station Facilities)

Origin/destination	Distribution proportion
Mainland (A5)	0.9%
Mainland (A55)	66.0%
Mainland Bangor (assumed Junction 10)	13.5%
Mainland (A487)	19.5%
	100.0%

Visitors have been assumed to all represent car trips and have been assumed to arrive at each site in a triple stagger at the start of the day, with demand split evenly between each stagger. It has been assumed that for Monday to Friday, visitors arrive at 07:30, 08:30 and 09:30 and depart in a similar triple stagger at 16:30, 17:30 and 18:30. On a Saturday, visitors have been assumed to arrive at Associated Development and Off-Site Power Station Facilities at 07:30, 08:30 and 09:30 and depart at 12:30, 13:30 and 14:30.

6.2.10. A5025 On-line and Off-line Highway Improvements: Staff

Data for the construction staff associated with the A5025 On-line and Off-line Highway Improvements has been derived from a combination of information provided by RSK.

Jacobs has been provided with total numbers of staff for both the A5025 On-line and Off-line Highway Improvements. Jacobs has therefore divided these totals by four (representing the number of staff associated with each section of the A5025 On-line and Off-line Highway Improvements) and specified routings accordingly. Construction staff have been assumed to travel by car.

Jacobs has assumed an even split between all four sections of the A5025 On-line and Off-line Highway Improvements during the full construction period. Therefore, an even proportion of construction traffic has been routed to each section over the 12-month construction period for the A5025 On-line Highway Improvements and the 18-month construction period for the A5025 Off-line Highway Improvements.

Bespoke routings have been created between the nearest available junction for which traffic count data are available in the model for each section of the A5025 On-line and Off-line Highway Improvements and each origin/destination associated with the combined home-based and non-home-based distribution established from the Gravity Model.

In addition, technical information provided by Horizon specify a number of office-based support staff would also be required during the construction of the A5025 Off-line Highway Improvements. These staff have been assumed to be located at a proposed recycling centre at Cefn Coch with all office staff assumed to travel by car. The same combined Gravity Model distribution has been applied to office staff. For the A5025 On-line Highway Improvements, technical information provided by Horizon state a total of 17 office-based staff. For the A5025 Off-line Highway Improvements, a total of 23 office-based staff per day have been stated.

For construction workers, two shift times have been assumed in the Traffic Model. Both shifts have been applied to Monday to Friday and Saturday as follows:

- summer shift (07:00 to 18:30 Monday to Friday and 07:00 to 13:00 Saturday); and
- winter shift (08:00 to 16:00 Monday to Friday and 08:00 to 13:00 Saturday).

Summer staff shifts have been assumed to be operational for quarter 2 and quarter 3 (i.e. April to September) and winter summer staff shifts have been assumed to be operational for quarter 1 and quarter 4 (i.e. October to March).

For office staff, a single shift has been assumed 09:00 to 17:00 Monday to Friday only.

Construction staff (both operatives and office-based staff) for the A5025 On-line and Off-line Highway Improvements have been assumed to be sourced from the local labour market given the non-specialised nature of the bypass improvements and therefore the Daily Commuting Zone home-based distribution identified in Table 6.26 above has been applied.

6.3. Construction HGV and LGV Routing

6.3.1. Origins and destinations

All HGV and LGV movements related to main site construction are assumed to route to/from the mainland with a breakdown of 90% from the A55 beyond Llanfairfechan and 10% travelling along the A5 from Tregarth.

6.3.2. Routings

It has been assumed that all HGV and LGV trips associated with the WNDA development construction activity (including construction of the Site Campus) have been assumed to route via the Logistics Centre.

The Logistics Centre represents a facility at Parc Cybi, located off Junction 2 of the A55 and is intended to monitor the flow of construction vehicles to the WNDA development. All HGVs and LGVs related to the WNDA development construction are assumed to require a permit to enable onward travel from the Logistics Centre to the WNDA development.

Only inbound trips travelling to the WNDA development are assumed to route via the Logistics Centre. Return trips are assumed to route directly back to origin/source.

In addition, the completion of the A5025 Off-line Highway Improvements also forms part of the wider embedded mitigation being delivered as part of the Wylfa Newydd Project to limit the impact of construction traffic on local communities. The implementation of the A5025 Off-line Highway Improvements impact on the delivery timings during which HGV and LGV trips have been assumed.

Throughout the duration of the Wylfa Newydd Project, HGV and LGV routings vary depending on status of the Logistics Centre at the specific time in question. The Logistics Centre is scheduled to become operational in quarter 3 of 2020 and is intended to perform a key function in the delivery of materials to the WNDA development.

Between 2018 and quarter 3 of 2020, the Logistics Centre would not be operational. Therefore, all HGV and LGV traffic has been assumed to travel directly to/from the WNDA development between the hours of 07:00 and 19:00. However, during this time, the effect of construction traffic is mitigated by restricting the HGV/LGV deliveries during the hours of 08:00-09:00 and 15:00-16:00 that coincide with local school traffic on the A5025. This staggered profile has been represented in the model.

Once the Logistics Centre is built and in operation (from 2020 quarter 3 onwards), the HGV operation maintains the delivery profile outlined above until the end of quarter 4 of 2020; however, during this period all HGV and LGV trips are assumed to route via the Logistics Centre.

The A5025 Off-line Highway Improvements are scheduled to be completed at the end of quarter 4 of 2020. Beyond this period, the same vehicle routings identified above would be in operation via the Logistics Centre; however, the delivery period represents an unrestricted 12-hour window from 07:00 to 19:00 following completion of the bypasses, thereby removing the potential conflict between increased HGV movements and local school traffic on the A5025. All HGV and LGV traffic has been assumed to occur Monday to Friday only irrespective of the Logistics Centre and bypasses being in operation.

The Logistics Centre is anticipated to remain in operation until the Wylfa Newydd Power Station construction period ceases at the end of 2027.

In both cases pre and post A5025 highway improvements, it has been assumed that the delivery window is front-loaded, with the first two-hours of the window being uplifted. The hours of 07:00 – 08:00 and 09:00 – 10:00 have been uplifted to represent 50% of the HGV deliveries over the day, with the remaining 50% distributed evenly across the remaining 10 hours.

6.3.3. A5025 On-line and Off-line Highway Improvements HGV routings

Data for the construction HGVs associated with the A5025 On-line and Off-line Highway Improvements on the have been derived from information provided by RSK, based on anticipated material quantities required for the A5025 On-line and Off-line Highway Improvements. Many of the same assumptions described in Section 2.4 regarding staff have also been applied to HGVs, in relation to equally dividing the total HGV numbers across the various sections that comprise the A5025 On-line and Off-line Highway Improvements, with appropriate bespoke routings created for each section/location.

HGV trips for the A5025 On-line and Off-line Highway Improvements have all been assumed to route to/from the mainland, as follows:

- A55 east (Llanfairfechan) – 90%; and
- A5 (Tregarth) – 10%.

HGV deliveries for the A5025 On-line and Off-line Highway Improvements have been assumed to occur over a six-hour delivery window, Monday to Friday only. HGV traffic has been split by the vehicle class OGV1 and OGV2 on a 25% and 75% split respectively.

In addition to HGV deliveries, it has been assumed that HGVs also shuttle between the different sections being delivered, for the A5025On-line and Off-line Highway Improvements. The total volume of shuttle traffic between sections has been established from information provided by RSK and includes materials being retained and recycled on-site.

In terms of the A5025 Off-line Highway Improvements, HGV shuttles have been assumed to route between Valley and Llanfachraeth sections and between Llanfaethlu and Cefn Coch sections, with an equal split of vehicles assigned to each shuttle route. All shuttle traffic has been assumed to reflect two-way return trips.

In relation to A5025 On-line Highway Improvements, HGV shuttles have been assumed to route between each section and a proposed recycling centre, which is understood would be located close to the proposed AECC/ESL Off-Site Power Station Facility. Due to limited information at this stage regarding the location of the proposed recycling facility, all shuttling traffic has been assumed to route between each On-line section and the AECC/ESL access. All shuttle traffic to/from the recycling centre has been assumed to reflect two-way return trips.

All HGV shuttle traffic, associated with A5025 On-line and Off-line Highway Improvements has been assumed to occur between 09:00 and 15:00 Monday to Friday and 09:00 to 13:00 on a Saturday.

6.4. Weekend Effect

An important consideration of the Traffic Model relates to the weekend effect resulting from the 11 in 14 working pattern that allows approximately half of the workforce to go home at weekends on a rolling basis. The Traffic Model has therefore been structured to cater for the increase in traffic associated with this temporary effect, whilst also ensuring that the residual working operation during the construction over a weekend is proportionally reduced. The remaining sections will identify the assumptions that have been employed in ensuring the weekend effect is fully captured in the Traffic Model.

6.4.1. Travel times

It has been assumed that construction staff residing in the Site Campus or non-home-based accommodation and are not local to the area would travel to their source/place of origin every other weekend. Section 2.5 of this report identifies the assumptions that have been generated and applied to derive the proportion of staff likely to travel home depending on their origin and location of accommodation. However, in order to ensure that construction staff receive a full three days off in the 11 in 14 working pattern, it has been assumed that staff travelling home at weekends will do so on a Thursday evening and return on a Sunday evening.

The workers that are associated with the weekend effect will be those housed in the Site Campus or existing non-home-based accommodation elsewhere on Anglesey or the mainland. A consistent approach has been applied to the weekend effect timings for all workers irrespective of their accommodation type.

It has been assumed that staff travelling home would do so 30 minutes after arriving back at their accommodation following completion of their shift on a Thursday evening. The weekend effect trips are applied separately in the model, meaning that the standard shift pattern on a Thursday involving the normal commute trips between the various locations in the Daily Commuting Zone are still present. Applying the 30-minute off-set for the weekend effect trips will ensure that the weekend effect on a Thursday evening is appropriately staggered, to reflect the shift timings and will generally be in effect outside of the standard network evening peak period, particularly in relation to Britannia Bridge. It has been assumed that the weekend effect would only apply to day shifts (i.e. there would be no weekend effect associated with the end of a Thursday evening night shift).

The return journeys on the Sunday have been assumed to occur in three half-hourly staggers between 17:00 and 18:30, with an even distribution applied to each half hour period.

6.4.2. Routings

The weekend effect has been applied to different vehicle types and routings depending on the accommodation type and location.

Information provided to Jacobs by RSK in relation to the likely origin/destination of temporary workers travelling home as part of the weekend effect has been used to derive the likely distribution of car-based trips from the various existing accommodation locations and the Site Campus. It is understood the origin of workers is not likely to be uniform across the various accommodation locations and, for example, the number of overseas workers is likely to be higher in the Site Campus and Holyhead, where access to Holyhead Port or train station is easier allowing for onward travel.

The trips associated with the weekend effect reflect two key transport modes; bus trips to Holyhead and direct car trips.

The bus trips relate to trips for construction workers residing in the Site Campus or non-home-based accommodation in the North and East, Rest of Anglesey or Mainland Zone 1 without a private car. The bus trips from all of these locations route to Holyhead and reflect construction workers either catching a ferry for onward travel to Ireland or onward travel by train to the mainland from Holyhead train station. A return pick up bus trip is also assigned from Holyhead to the same accommodation areas on a Sunday.

For workers residing in the Site Campus, as well as direct bus trips to Holyhead, some workers also park directly at the campus as well as parking during the week at the Park and Ride site. Therefore, weekend effect car trips are also associated with the Site Campus weekend effect, as well as a bus shuttle and onward car trip from the Park and Ride site.

The remaining car trips relate to workers with access to a private car travelling back to a range of wider destinations on a Thursday and returning from those destinations on a Sunday. Some of these car trips represent a trip between the accommodation location and Holyhead, representing a car trip back to Ireland via the ferry from Holyhead. However, the majority of car trips representing onward trips to the mainland.

Trips to the mainland vary depending on the type of workers that have been assigned to various accommodation types. Therefore, the distribution information provided by RSK reflects this variation and has been captured in the Traffic Model. In general, the distribution applied to the mainland routes for car trips in consistent; however, the volume of car trips routing to/from Holyhead for onward travel does differ between locations. Based on the RSK information, it has been assumed car-based weekend effect trips routing to/from existing non-home-based accommodation and the Site Campus and the mainland have been distributed as outlined below.

Table 6.28: Mainland weekend effect distributions

Route	North and East	Holyhead	Rest of Anglesey	Mainland Zone 1	Mainland Zone 2 (but not captured in model)	Site Campus
A55 east	78%	64%	68%	66%	88%	100%
A5	9%	9%	14%	17%	6%	0%
A487	9%	9%	14%	17%	6%	0%

The same assumptions in relation to return trips on a Sunday have been applied to all vehicles, both car and bus, in terms of timings over a triple stagger (17:00 to 18:30).

No allowance has been made in the Traffic Model for weekend effect traffic that is generated in areas located within the Daily Commuting Zone on the mainland to other areas on the mainland.

7. Stage 4: Additional Model Assumptions – Operation

7.1. Introduction

This section of the report details the assumptions that have been employed to ensure that trip generation is accurately assigned for the relevant activities during the operation of the Wylfa Newydd Power Station.

In addition, the Associated Development and Off-Site Power Station Facilities that make up the Wylfa Newydd Project have also been considered in terms of their operation. The Associated Development is generally assumed to be operational during the WNDA development construction phase, whilst the Off-Site Power Station Facilities are generally assumed to become operational to support the operation of the WNDA development.

7.2. Associated Development Operation

The operation of the Associated Development is considered in two distinct components; firstly, there is the 'user impact' of their operation and, secondly, there is the logistical operation of their function. The 'user effect' of Associated Development sites has already been identified (i.e. the occupation of the Site Campus and the bus trips between the Site Campus and the WNDA development or the HGV routings associated with the Logistics Centre).

Therefore, this section will focus on the logistical operation of the Associated Development, and principally focuses on two key elements that generate traffic captured in the Traffic Model:

- facilities management; and
- servicing/deliveries.

The following sections will identify the assumptions that have been employed in the Traffic Model in relation to each.

7.2.1. Facilities management

Jacobs has been provided with staff numbers for facilities management by RSK. Table 7.29 below summarises the total number of facilities management staff that have been assumed for Associated Development, based on the data provided by RSK.

Table 7.29: Associated Development facilities Management

Associated Development	Facilities management staff
Logistics Centre	36
Park and Ride	17
Site Campus	343

The model has the functionality to provide specific peak and off-peak values associated with every entry, as derived from the activity profiling exercise described in Section 3 of this report. Therefore, based on the profiling exercise undertaken, the relevant number of peak or off-peak values has been captured for each quarter of each year in which each Associated Development is operational.

A consistent approach has been applied to facilities management across all Associated Development. It has been assumed that facilities management staff would predominantly be made up from the local labour market and therefore the home-based distribution established from the Gravity Model for the full Daily Commuting Zone is considered the most appropriate distribution profile to apply to facilities management staff. This differs slightly from the combined home-based and non-home-based distribution that has been applied to the majority of construction-related activity; therefore, the specific home-based Gravity Model distribution that has been applied to all facilities management staff for all Associated Development facilities is provided in Table 7.30 below.

Table 7.30: Home-Based distribution for Associated Development facilities management staff (Daily Commuting Zone)

Origin/destination	Distribution proportion
Amlwch	12.1%
Benllech	4.1%
Cemaes	8.2%
Gaerwen	2.0%
Holyhead	12.7%
Llannerch-y-medd	3.9%
Llanfachraeth	3.1%
Llanfairpwllgwyngyll	1.4%
Llangefni	3.3%
Menai Bridge	2.5%
Moelfre	1.5%
Rhosneigr	1.8%
Valley	6.2%
Mainland (A55 east)	22.0%
Mainland (A5)	3.5%
Mainland (A487)	8.5%
Mainland (Bangor A55 Junction 9)	0.8%
Mainland (Bangor A55 Junction 10)	2.4%
	100.0%

All facilities management staff for the Park and Ride and Logistics Centre have been assumed to travel by car. It has been assumed that facilities management staff for the Site Campus would travel by a combination of car and minibus (reflected as LGVs in the model). The mode split applied for cars and minibuses is 50% by car and 50% by minibus. All facilities management staff at all locations have been assumed to work standard shifts (08:00 to 17:00) seven days a week.

7.2.2. Servicing and deliveries

Servicing and delivery vehicle numbers have also been derived from information provided to Jacobs by RSK. A consistent approach has been applied to servicing and deliveries assumptions across all Associated Development locations. All deliveries and servicing vehicles have been assumed to route to each location to/from the mainland, using the following distribution breakdown:

- A55 east (Llanfairfechan) – 45%;
- A487 – 25%;
- A5 (Tregarth) – 5%; and
- A55 (Bangor) – 25%.

All servicing and delivery vehicles have been assumed to operate on a six-hour delivery window between 09:00 and 15:00 on the A5025, with a vehicle breakdown that assumes that 95% of servicing and delivery vehicles represents LGVs, and 5% of vehicles representing HGVs. Servicing and deliveries have been assumed to occur seven days a week during the operational period of Associated Development.

In some instances, such as the Park and Ride or the Logistics Centre, servicing and delivery traffic is assumed to be very low, and totals one vehicle delivery per day. In this instance, the one vehicle has been assumed to route to/from the A55 east on the mainland and arrive between 09:00 and 09:30.

7.3. Main Site Operation

7.3.1. Operation staff

The majority of the information relating to the WNDA development operation has been provided by Horizon in a 'Wylfa Newydd Operational Phase Information Summary' document dated June 2016 and a more recent 'Power Station Development Particulars' document (revision 3.0). Jacobs has supplemented this information with assumptions where necessary to fully capture the operational impacts of the Wylfa Newydd Power Station in the Traffic Model. These assumptions are summarised in the following sections.

It has been assumed that the WNDA development operation would be undertaken by a number of staff, including normal operative staff, critical shift workers and security staff. Information provided by Horizon stated that typical staff numbers would not exceed 755 staff on-site at any one time. Therefore, Jacobs has assumed the following breakdown of staff:

- 665 standard operational staff (including some critical shift and security staff);
- 100 critical shift workers; and
- 80 security staff.

Jacobs has been advised that security staff and critical shift staff would work two continuous shifts that differ from standard operational staff. On the basis that there would be no more than 755 staff on-site at any one time, it has been assumed that the 665 standard operational staff includes half of the critical shift workers (50) and half of the security staff (40). The remaining 50 critical shift workers and 40 security staff are assumed to work a night shift. Further information relating to shift timings is provided below.

It is understood that the WNDA development would not become fully operational until 2027. However, it has been assumed that operational activities would begin relatively early and gradually increase over time before full operation comes into effect in 2027.

Table 7.31 below summarises the rate of operational activity associated with each year. However, the totals input into the model were based on quarterly time periods and, therefore, may differ slightly from headline annual totals as detailed below. Headline numbers are presented as the number of vehicles, assuming a car share factor of 1.5 staff member per car.

Table 7.31: WNDA development operation activity

Year	Normal operative staff
2019	15
2020	69
2021	149
2022	240
2023	390
2024	471
2025	611
2026	665
2027 onwards	655

A consistent approach has been applied in terms of the distribution of operation staff in the Traffic Model. It has been assumed that the majority of operational staff would not involve specialist workers and therefore the Daily Commuting Zone home-based worker distribution derived from the Gravity Model and summarised in Table 7.31 of this report has been applied to all three operation worker types.

All operational staffs have been assumed to travel to the Wylfa Newydd Power Station by car. The following shift timings have been assumed and applied consistently seven days a week:

- normal operative staff – 08:00 to 16:00 (information provided by Horizon);
- critical shift workers – two 12-hour shifts (07:00 to 19:00 and 19:00 to 07:00). Workers split evenly between each shift; and
- Security staff – no information provided, assumed same shift timings as critical shift workers.

7.3.2. Deliveries

Information provided by Horizon highlights that up to 34 deliveries per day would be generated during the operation of the WNDA development. All delivery traffic has been assumed to route to/from the mainland and the Power Station, based on the following distribution:

- A55 east (Llanfairfechan) – 45%;
- A487 – 25%;
- A5 (Tregarth) – 5%; and
- A55 (Bangor) – 25%.

It has been assumed that HGV deliveries would be undertaken seven days a week over a 12-hour delivery period, 07:00 to 19:00 based on the assumption the A5025 Off-line Highway Improvements would be in place during WNDA development operation.

Delivery traffic has been assumed to reflect a 50% split between LGVs and HGVs, with HGV traffic split 12% and 38% by OGV1 and OGV2 vehicle classes respectively. It has been assumed that deliveries would begin from 2024 onwards at a rate of 34 per day.

7.4. Outage

Jacobs has been provided with information by Horizon relating to the number of outage occurrences at each WNDA development reactor. This is provided in the Horizon document 'Wylfa Newydd Operational Phase Information Summary' dated June 2016.

Each reactor outage has been assumed to occur every 18 months. Both reactors would not undergo outage at the same time, with an outage at Unit 1 being followed by an outage at Unit 2 six months later and so on. Based on this schedule, Table 7.32 below summarises the number of outage occurrences assumed to occur per year, which are reflected in the Traffic Model.

Table 7.32: Outage occurrences

Year	Type of outage
2027	Single outage
2028	Single outage
2029	Single outage
2030	Double outage
2031	Single outage
2032	Single outage
2033	Double outage
2034	Single outage
2035	Single outage

Each Scheduled Outage occurrence is assumed to result in an increase in staff for a period of six weeks in each case. Additional staff numbers associated with periods of outage is assumed to be 1,000; therefore, the total number of staff on-site during periods of outage would not exceed 1,755. During periods of outage, the additional operational staff have been assumed to operate on two 12-hour shifts as identified by Horizon. No information on specific shift timings have been provided; therefore, it has been assumed outage staff would operate on the same shift timings as critical shift workers during normal operation (i.e. 07:00 to 19:00 and 19:00 to 07:00) with staff split equally between each shift.

In relation to outage staff distributions, it has been assumed that temporary outage staff would represent specialist staff that would not ordinarily be sourced from the local labour market. Therefore, it has been assumed outage staff would generally represent temporary staff from further afield who would reside in the locality of the Power Station during each six-week outage period. On this basis, Jacobs has interrogated the Gravity Model and determined a suitable distribution based on the non-home-based existing accommodation total for the Daily Commuting Zone. This distribution is summarised below.

The bed availability across various accommodation types has been calculated for each ward, allowing a suitable proportion to be applied to each. These wards/proportions have then been grouped according to key origin/destinations identified in the Traffic Model and the associated proportion assigned to the relevant route. Table 7.33 below summarises the distribution assigned to outage staff, based on non-home-based existing accommodation availability across Anglesey and the mainland.

Table 7.33: Outage staff distribution

Origin/destination	Distribution proportion
Amlwch	11.1%
Benllech	10.9%
Cemaes	11.7%
Gaerwen	1.9%
Holyhead	20.6%
Llannerch-y-medd	2.7%
Llanfachraeth	5.3%
Llanfairpwllgwyngyll	1.3%
Llangefni	3.2%
Menai Bridge	3.2%
Moelfre	5.5%
Rhosneigr	2.6%
Valley	5.3%
Mainland (A55 east)	0.5%
Mainland (A5)	2.5%
Mainland (A487)	6.0%
Mainland (Bangor A55 Junction 9)	1.4%
Mainland (Bangor A55 Junction 10)	4.3%
	100.0%

All outage staff have been assumed to travel between their non-home-based accommodation and the Power Station by car.

One additional HGV delivery trip has been assumed to occur during periods of outage; routed to/from the A55 east on the mainland and the WNDA development, arriving on-site by 10:00 and departing in the following hour.

No visitors have been assumed during the WNDA development operational phase, or during periods of outage.

7.5. Off-Site Power Station Facilities Operation

The Off-Site Power Station Facilities represent supporting facilities located outside of the Wylfa Newydd Development Area but that are essential to the standard operation and function of the WNDA development. The assumptions associated with each of the Off-Site Power Station Facilities are outlined below.

7.5.1. MEEG

Horizon has confirmed that no operational workers would be based at the MEEG facility. Workers would visit the facility infrequently once per month, with one HGV and one LGV delivery assumed per month. Given the infrequent nature of staff and deliveries and the very low number, no specific allowance for these trips has been made in the Traffic Model.

7.5.2. AECC/ESL

Horizon has confirmed that no operational workers would be based at the AECC facility. Workers would visit the facility periodically in small numbers (20 to 30 staff) for training; the number of visits has not yet been determined. One LGV delivery is assumed to occur per month. Given the low number of staff and deliveries and the yet undetermined frequency of visits, no specific allowance for these trips has been made in the Traffic Model.

Horizon has confirmed that the ESL would be staffed by two staff per day, with a working shift pattern of 09:00 to 17:00. This has been captured in the Traffic Model and it has been assumed that staff would route between the WNDA development and the ESL facility on a daily basis to perform their shift. Two workers are assumed to travel in one vehicle. One HGV delivery is assumed per month; therefore, no specific allowance has been made for deliveries in the Traffic Model. The ESL has been assumed to be operational from 2024 onwards.

7.6. Radioactive Waste Buildings

Horizon has confirmed that the construction of Radioactive Waste facilities are planned between 2033 and 2035 and are therefore scheduled to occur once commencement of operation has occurred. The design and construction methodology of the Radioactive Waste Buildings is not yet confirmed; however, Horizon has identified the following key assumptions that are captured in the Traffic Model:

- the construction programme would require 76 construction workers throughout the build programme;
- 20 LGVs per hour would be required over a 10-hour period during concrete pours. Concrete pouring is expected to occur in 2033 only over no more than 20 days; and
- five HGVs per day would be required over the remainder of the construction period.

Additionally, Jacobs has assumed 50 visitors and 57 LGV trips per day would occur during the construction of the Radioactive Waste Buildings.

Jacobs has applied the same assumptions relating to construction worker distribution, shift timings, HGV and LGV traffic distribution and visitor distribution that have been applied for the WNDA development operation and summarised in Section 2.1 of this report.

8. Summary

Jacobs has prepared this Strategic Traffic Model Assumptions Report to detail the various assumptions that have been employed for deriving and capturing vehicular trips associated with the Wylfa Newydd Project in the Strategic Traffic Model.

The report focuses firstly on the derivation of the vehicular input data for the various components of the Wylfa Newydd Project, including how these data have been summarised and prepared in order to reflect the varied activity over time during the construction and operational phases of the Wylfa Newydd Project as well as ensuring compatibility with the structure of the Traffic Model.

Secondly, the report identifies the various assumptions that have been made in order to furnish the Strategic Traffic Model with the vehicular input data values that have been calculated.

This report should be read in conjunction with the Strategic Traffic Model Method Statement, which provides an overview of the model development, its structure and functionality and provides the context as to why particular assumptions have been required in order to ensure input data align with the model structure.