HOW TO INITIATE A CAPACITY PLANNING AND MANAGEMENT PROCESS FOR A RAPID DEPLOYMENT UNIT OF A SECURITY SERVICES COMPANY

Case Study Support Services Group Ltd.

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ABSTRACT

Support Services Group Ltd. was founded in 2000 to provide security and risk management services for companies within the United Kingdom. The enterprise has encountered rapid development and growth which lead to establishing a Rapid Deployment Service product. The product was created to answer sudden and volatile demand by correlating supply.

The capacity for the supply has not been planned or managed coherently creating a call for a research on how such a process could be initiated. The purpose of the thesis is to point out the capacity management mishaps and the objective is to form a solid platform where a capacity manager can champion the process.

The research was carried out as case study. The database of the company provided the information which was then analyzed using a mix of both qualitative and quantitative methods. The means of cartography were also used to illustrate the data. Therefore, it is recommended for the reader to get acquainted with the geography of the United Kingdom.

The result suggests that the capacity decision have not been given much thought. The usage of capacity is inefficient, uncontrolled and waste-creating. Although the company has grown, its profits have stagnated as unnecessary costs of subcontracting have increased.

The findings indicate that increasing capacity flexibility and adopting a Just-In-Time approach increases efficiency, eliminates waste of money, resources and time and improve the overall profitability. The implementation of capacity strategy enhances the visibility of the organization making it easier to monitor and control. Further research is recommendable for the actualizations of numerical figures.

Keywords: Capacity Management, Capacity Planning, Support Services Group, United Kingdom

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1. INTRODUCTION

1.1 Background

The idea for the thesis emerged as I was completing my practical training at Support Services Group Ltd in the United Kingdom as a part of my International Business studies. The original proposal for thesis came to be as the outcome of a think-tank conducted by the General Manager and me. Several problem areas of the company were brought to my attention which lead me to refine the idea of a thesis revolving around capacity management. The company was established in 2000 and it has never implemented capacity strategies. Being a relatively young company experiencing strong growth, unplanned capacity could result in grave problems if the growth continues to take place organically and uncontrollably.

Generating significant part of total revenue and overall growth, the company's newest product Rapid Deployment Service is experiencing stagnated profits. Due to inefficient capacity usage and lacking of monitored capacity management, the expansion of RDS is seen as troublesome. Therefore, the possibilities of cutting these deficiencies and creating a situation where profits increase in correlation to other performance indicators are to be sought through the means of capacity management and planning.

Additionally, it is recommendable that the reader acquaints themselves with the geographic structure of the United Kingdom since major portion of the discussions are rendered through means of cartography. In order to get a clear picture of the matter at hand, familiarizing oneself with the overlook of UK's most notable areas facilitate the understanding of results and the overall aspect of the thesis.

1.2 Purpose of the Thesis

The purpose of this thesis is to express the fundamentals of capacity management and planning. The objective is to show how important these actions are and how they can facilitate a company at any given state; starting, growing, stable, to enhance their activities, increase efficiency in their processes and indirectly affect their profits positively.

The viewpoint is taken from the angle of Support Services Group's RDS product as capacity management or any direct capacity related strategies haven't been implemented.
The main objective is to provide information regarding capacity management, point out related issues within RDS portfolio and ultimately create a starting point from which an assigned person or team could tackle the issue. The means and methods are provided in order to build a functioning capacity strategy. The issues which are brought to attention are the most significant and urgent ones. The noted problem factors act as key reasons to establish a capacity strategy while they hinder the functional and financial well-being of Support Services Group.

1.3 Research method

The research method is a mix of both quantitative and qualitative methods. Although capacity management issues are generally expressed in quantitative outcomes, an analysis of capacity issues regarding a service company requires additional qualitative approach. The two used approach methods, case study and action research, support the usage of both measures. Case study is primarily defining the quantitative problems but the action research and its results are stated in numerical changes of environment. The results were not implemented but presented as suggestion outline as the fundamental scheme was to give the needed competences for an entity which would commence the capacity management.

2. CAPACITY MANAGEMENT AND PLANNING

The most successful events and actions in the world are primarily the outcomes of coherent and linear planning. In order to excel, one must point out the steps towards success with awareness. The actualization of competences, resources and capabilities will widen the viewpoint so it comes clear where the development leads to and which tools are to be possessed and/or used at which point of the way.
Capacity planning is the perspective of businesses to map out their capabilities. Therefore, capacity planning is the one of key performance elements of a functional business.

When executed through careful and considerate calculations, capacity planning can be the sole ingredient which would make the profits of an enterprise boom. However, companies which do not focus enough on management of strategic capacity planning will encounter serious difficulties or even disastrous problems especially during a growth or starting period.

2.1 Strategic Capacity Planning

The word capacity normally defined in Business dictionary as "specific ability of an entity (person or organization) or resource, measured in quantity and level of quality, over an extended period." (BusinessDictionary.com, 2011)
In other words, capacity refers to the skill to hold, receive, store, or accommodate. In general business logic, it's often viewed as the amount of output that a system is capable of achieving over specific period of time. (Jacobs & Chase 2008, 53.)
Capacity also refers to the limitation which the operating element is able to process; the amount of services executed or tangible products produced. The vital elements and considerations needed to be taken into account before-hand are what type of capacity – whether it's equipment, space or human skills – are needed, how much of it is required and the timeframe of when those factors are to be accessible. (Beamer 2010.)
Professors F. Robert Jacobs and Richard B. Chase (2008) define strategic capacity planning as an approach tactic which is the idea of determining the total levels of capacity for resources mentioned above. The common feature of these resources is the scarce and the finite nature, which is normally described as "capital-intensive" but also the availability in terms of - often placed secondary in importance - time reflecting the reasons why planning is necessary. (Jacobs & Chase 2008, 54; Hope & Mühlemann 1997, 261)

2.1.1 Purpose of Capacity planning

The main point for an organization to perform plan capacity usage in advance is to match its supply competence and capability levels with the predicted demand by the customer. Capacity plan is formed to support the company's main competitive strategy and it has to be inline and correlate with it. The accuracy of the capacity plan is in sync

with the company's ability to actualize their capabilities enabling them to have precise respond to the needs of the customer. Should the situation be so that the demand is too excessive, through a detailed plan it is easy to seek out the required steps which are to be done in order to satisfy the demand. Insufficient or otherwise inadequate capacity may turn out to be costly for the company as unpleased customers are lost and such a market attracts competition fasters. The demand and how it is predicted will be discussed further along this chapter. (Jacobs & Chase 2008, 54; Kemal İlter)

2.1.2 Capacity measurement definition

Capacity as a term is in directly aimed at the rates of output of the operations in question. The output is normally indicated through a rate which presents the amount of deliverables completed in a period of time. For a small pub, a fairly demonstrative measurement could be for instance drinks sold in a day. The actual output rate gives a mere indication of the daily result. In order to assess the rate further to determine the actual effectiveness, two capacity efficiency performance indicators are to be used. Those indicators alongside the formulas are presented in the Equation 1. (Jacobs & Chase 2008, 54; Beamer 2010)

$$\text{Efficiency} = \frac{\text{Actual output}}{\text{Effective capacity}}$$

$$\text{Utilization} = \frac{\text{Actual output}}{\text{Design capacity}}$$

Figure 1. Capacity efficiency rate formula & Capacity utilization rate formula. (Kemal İlter)

The efficiency ratio expresses the give day output of the pub in correlation to the best possible daily rate. The effective capacity is a measure which the process was designed for, but which can be realistically expected as a result; while taking into consideration

miscellaneous factors which keep the process reaching its peak due to their inevitability. Examples of such in the given surrounding could be maintenance, personnel breaks, etc. Design capacity is the best possible level for an operation, process or a facility to deliver. In manufacturing, the design capacity reflects the volume of output with a minimized cost of an average unit. Ideally, the design capacity – also known as best operating level - would be in direct link to productivity but as various uncontrollable reasons prevent operations to reach maximum capacity, it is vital to use both indicators as results lead to different interpretation. Both of the ratios are normally expressed in percentages and give an idea of improvement needs. Efficiency ratio shows how effective we are in terms of productivity whereas utilization ration indicates the need for improvement within the process itself. Evidently, where there are bigger the gaps –the resulting number being a lot less than 100% - between the figures, lie a greater opportunity for an improvement. Low percentage value in efficiency indicates insufficient variable resources such as employees who required more training or orienting and a low value in utilization indicates the problems within the actual process for instance the bar tap needing maintenance frequently. (Jacobs & Chase 2008, 54; Beamer 2010)

2.2 Capacity decisions

By their nature, capacity decisions are generally strategic involving investments and therefore commitment in resources such as equipment, buildings and manpower. In light of this factor, capacity decisions affect greatly into a myriad of organizational functionality. These decisions have an enormous impact on the ability to meet the future demands for the goods an organization is offering. Costs are widely influenced by capacity decision as operating costs are larger when there are investments in resources. Additionally, the initial cost of the product is determined by the unit cost which is normally a direct derivation from the costs of the capacity used. Other areas which are affected are the ease of management; better capacity, easier to manage, and competitiveness of the company. Coming to the 21st century, globalization has added its share into the capacity decision mix by highlighting the importance as the markets and competitors are operating in a global scale and increasing the complexity. All these reasons emphasize the need to plan these crucial choices in advance. Capacity decisions can be divided into

three categories: Long-term, medium-term and short-term. (Hope & Mühlemann 1997, 261; Beamer 2010; İlter)

2.2.1 Long-term capacity decisions

Long-term capacity decisions are made in a timeframe of greater than a year. Including top management participation, long-term plans concern productive resources which take a longer time to acquire and/or dispose. These resources include for instance buildings and facilities. Because of the gravity of these choices, they are to be done in the knowledge of the external factors which could affect the decision-making. Such components are markets, major competitors and PEST (political, economic, social and technical) environment. Figure 2 expresses the relation of all of these factors graphically. (Jacobs & Chase 2008, 53; Hope & Mühlemann 1997, 261)

Long-term capacity decisions are made to either increase or reduce capacity. The reason for the action lies in the change of forecasted demand. Let's take an example of a fast-food restaurant which is located in a city which is expected to double up its habitants due to an increase in job openings and low property tax rate. The options for the restaurant are to either expand their current premises or open another restaurant in a different location within the city. The change and disturbance which the increase causes do not have a remarkable effect in terms of possible losses and the confusion period is seen to last a short period of time. What the managers should consider on is the economies (or diseconomies) of scale. Expansion of current premises would increase the level of served customers, but it might lower the actual efficiency rate. The restaurant would have to hire more people which could lead into a decrease rate of customers served by employee. However, if an identical restaurant is opened in a new location, the capacity efficiency rate would ideally stay at the same level. In both of the cases the operating cost would increase. Expansion would boost the sales but it could lead to stagnating profits which would not happen if a new branch of the restaurant is opened. (Jacobs & Chase 2008, 55; Hope & Mühlemann 1997, 261-262)

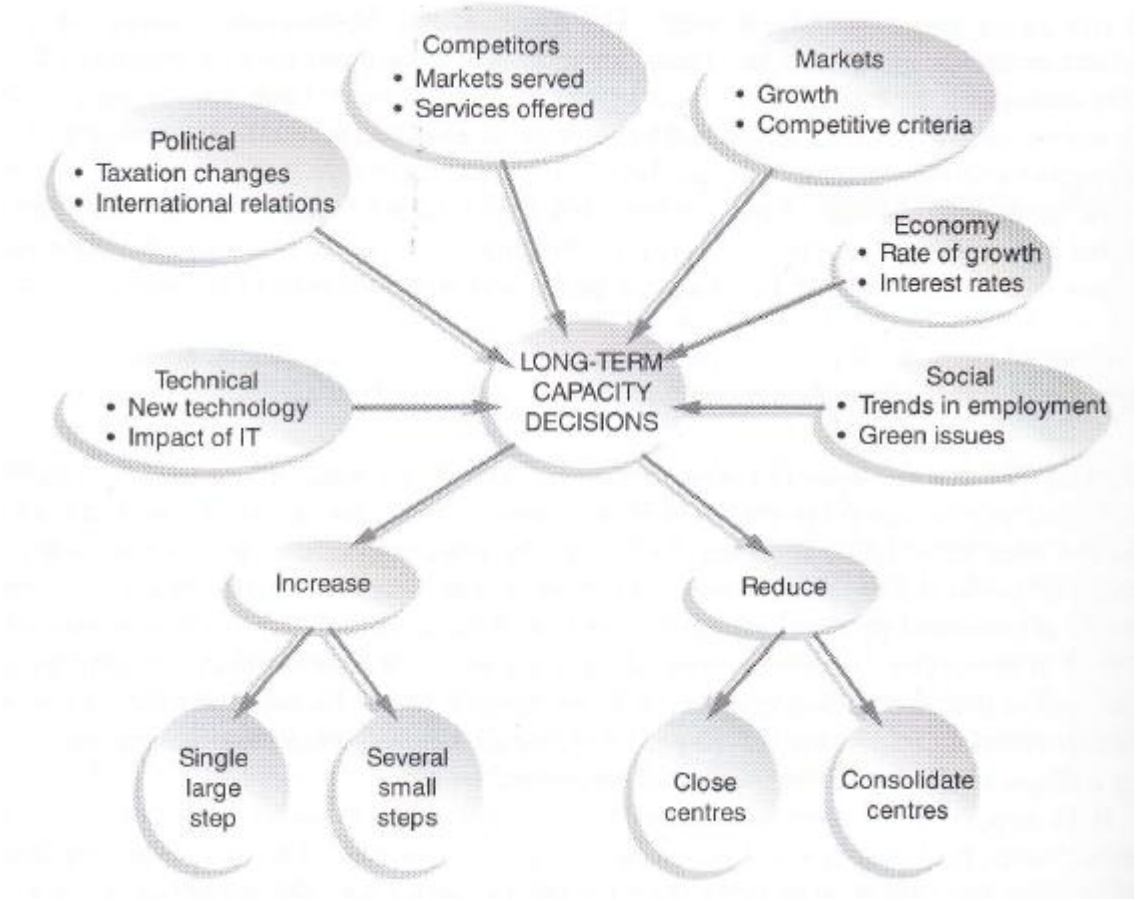

Figure 2. Long-term capacity decisions. Hope & Mühlemann 1997

2.2.2 Medium-term capacity decisions

Whereas long-term capacity decisions can be considered as the macro viewpoint of capacity planning, medium-term takes care of the micro view. The timeframe here is from 6 to 18 months. However, depending on the organization medium-term and short-term capacity decisions do not have a clear separation but are carried out while linked to each other. Therefore, medium-term range can include timescale as specific as weeks. The focus point here is on "softer" resources which include human resources and minor equipment purchasing. Decisions made within this concept are executed in order to match the supply with demand. To do this, the company can either adjust the supply of resources or the demand. (Jacobs & Chase 2008, 53; Hope & Mühlemann 1997, 263) Adjusting the demand is highly complex activity. Sudden changes in demand are somewhat impossible to foresee. Organizations can try to manipulate demand through marketing. Aggressive commercials entice people in to consuming more. Other attempts

to affect the demand could be two-for-one offers at restaurants during a specific day of the week, which try to lure in customers when business is usually slow. This practice is known as yield management; predicting and altering demand to maximize revenue. Yield management is applied in situation which requires determining the best possible price and timing of a capacity to the most suitable customer segment. Offering a family holiday week at a resort during school summer vacation at a price affordable by most families with children to get peak levels in sales is a fine example of yield management. (Hope & Mühlemann 1997, 263; Jacobs & Chase 2008, 298-299)
Possibilities to adjust capacity to meet the demand are deeply associated with the flexibility of the resources. Flexibility will be discussed later on in its own chapter. Flexibility refers to the ability of the organization's capacity to adapt to changes; multi-skilled employees, overtime, having alternatives to material resources or speeding up the use of physical resources (libraries limiting the use of computer/internet per customer). Concentration on one aspect of resources being flexible might not be the best choice to act by. Most companies perform a mix of human, physical and material resources in terms of flexibility. (Hope & Mühlemann 1997, 263-265; Delarue, Gryp & Van Hootegem 2006)

The two described options - shown in Figure 3 - are forms of capacity management strategies. Typically, when efforts are made to alter demand, it is called level capacity. In this strategy the focus is on the process and the capacity remains at a somewhat fixed level and increases/decreases are made in big "chunks". The positive aspect of the strategy is the stable level of service. However, as the capacity is limited it might result in queuing situations and possibly to unsatisfied demand. It is recommended for organizations which are dealing with level capacity strategy to maintain excess capacity. The demand following capacity which relies on the flexibility of capacity focuses on the customer. In comparison to level capacity strategy, adjusting capacity to follow demand requires a lot more monitoring and controlling and has a certain instability factor as the increases/decreases are made more frequently. (Hope & Mühlemann 1997, 263-265; Jacobs & Chase 2008, 62)

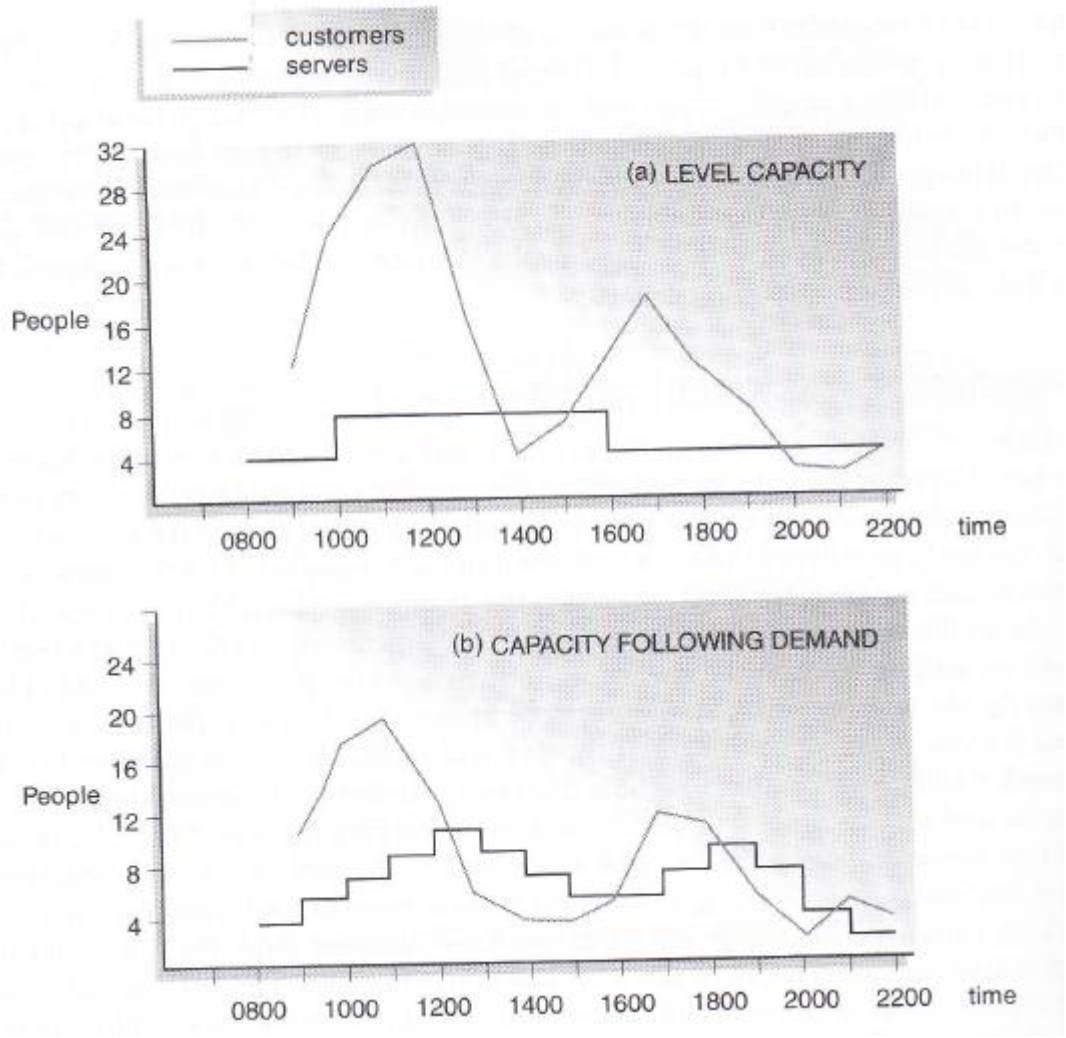

Figure 3. Capacity management strategies. Hope & Mühlemann 1997

2.2.3 Short-term capacity decision

As mentioned before, short-term capacity decisions are strongly linked to medium-term decisions. The timescale is less than one month. The decision might even be made for daily or weekly scheduling. Short-term capacity decision could be presented as fine-tuning of medium-term decisions. The capacity, determined and acquired through medium-term plans, is made to match the demand by eliminating variance between planned and actual output. The flexibility of the resources are put to test here as sudden changes in demand require rapidly executed moves through such means as employee overtime and alternative production routings. (Hope & Mühlemann 1997, 263-265; Jacobs & Chase 2008, 53)

2.2.4 When to add capacity

When should a company acquire more capacity? Unfortunately, it is impossible to determine a solid equation which every company could use to establish the frequency of adding and the situations when extra capacity is required. The field in which the company operates, the type/size of the organization, the processes which the company executes and most importantly the expected demand are the variables which - once assessed - point out the needs of attaining new capacity.
Idyllically, an organization carries out their processed so that the output between the stages is the exact amount needed for the following stage. The processed would not be interfered so that resource would be idle and waiting time would then perish. Furthermore, bottleneck situations are to be avoided. Bottleneck effect portrays a defect where the output of consecutive processes is halted because of the resources of the last stage are not sufficient enough. This practice is called maintaining system balance which aims to reduce the inequality and imbalance of the use of resources in terms of functional operating. The depicted conditions are theoretical examples of where capacity additions are needed. (Jacobs & Chase 2008, 61-62)

The frequency of capacity addition could be filed into two categories according to the costs which the new resources cause. Logically, a costly development is normally of a larger scale and thus done less frequently. In example, a football team qualifies to play the next season at the top division. The growth of fan base increases the demand of tickets. Because of the forthcoming change, a new stadium with larger capacity for viewer is to be built. In this example, capacity is expanded in a large portion and as one could imagine, a new football stadium is not a frequently made acquisition. On the other hand, the team might have a player who doesn't score too often, but as he hits a hot streak and takes the position of a leading goal scorer the demand for his jersey grows and the ability to match this growing demand by infrequent orders from the supplier can be placed on weekly basis depending on the players performance. (Jacobs & Chase 2008, 62)
When thinking of adding new capacity, a careful thought-through should be performed on whether it is sensible cost-wise to produce the good in-house or use external sources by outsourcing activities or sharing capacities (airlines combining routes). A number of issues are to be taken into consideration. If the organization possesses the resources to perform the activities itself, the product or service should be done in-house. When the

missing component is expertise it is recommendable to buy the skill unless it is needed for a defined and rather brief period of time when consultant services could be considered. Additionally, when a demand is steadily high, it is advocated that a company is better of keeping processes to itself. Notable fluctuations in demand propose the idea to use an external specialist. The use of external providers are aimed to lower fixed cost but such risks as uncertain quality and losing control of the total operation might keep organizations from utilizing the possibility. (Jacobs & Chase 2008, 62-63; Kemal İlter)

2.2.5 Requirements for capacity planning

In order to complete a realistic capacity plan, the requirements for the amounts of resources should be assessed and calculated. The complexity of the procedure increases in alignment to the timeframe. The levels of required resources should match the forecasted demand (Forecasting will be discussed more thoroughly in its own chapter) and the predicted sales. The aforementioned system balance should be maintained throughout the process, the flexibility of the resources outlined and the time of change selected carefully. (Jacobs & Chase 2008, 63; Kemal İlter; Beamer 2010; Hope & Mühlemann 1997, 250-251)

As some level of uncertainty in demand is inevitable, companies rely on capacity cushions which intend to counterbalance improbability of sales. The cushion amount exceeds the capacity level which matches the demand. Thus, it has an effect on the capacity performance rates which are lower the more cushions there is in stock. Conversely, if a firm's design capacity doesn't match the demand, this occurrence is called negative capacity cushions. The option of the ability to have capacity cushion differs a lot by the field of business. For manufacturing organizations, the capability to modify the cushion level is greater than for service organizations. A hotel does not have spare rooms as capacity cushions but handles such requirement by the flexibility of resources e.g. offering a suite to a customer who due to overbooking was left without a room. Other service providers simply don't have the option of not delivering service and in these cases the capacity cushion is extended to high levels. Examples of such activities are emergency services; police, fire, gas or water. Although the importance of capacity cushion is hig-

hlighted here, organizations keep in mind that unused capacity equal loss of money. (Jacobs & Chase 2008, 63; Kemal İlter; Beamer 2010; Hope & Mühlemann 1997, 264)

2.3 Forecasting

In capacity management, forecasting is a technique which involves prediction of sales (demand) for individual products. Forecasting is a difficult task and a spot-on forecast is practically impossible. However, a carefully executed prediction assessments guarantee a better quality and facilitate capacity planning. The methods of forecasting should seek improvement at all times as the activity is vital and significant during management decisions. Forecasting models can be split into two main groups: Qualitative and quantitative. In operations management literature, qualitative forecasting is occasionally referred to as judgmental forecasting. Furthermore, as forecasting is an art of thorough research and the variety of approach methods is in vast number. This chapter merely presents the ideas of the most common ones of the methods. (Jacobs & Chase 2008, 253; Hope & Mühlemann 1997, 251-252)

2.3.1 Quantitative methods

Quantitative forecasting techniques are utilized if historical information on the variable is obtainable. Past data is examined through their time series and the specific variables of interest examined. There is a wide range of quantitative forecasting methods, but all of them can be divided into two major categories. Therefore, the focal point of this chapter is pointed to these two categories instead of individual methods. The categories are: time-series method and causal method. (Jacobs & Chase 2008, 256; Hope & Mühlemann 1997, 251-252; Sahu)

Time Series Method – Time-series analysis circles around examining historical values; measurements are taken at specific points over a period of time. The scope and the frequency of taken measures can be taken at any regular interval; hours, years, days etc. The trend of the data, which normally presents a random fluctuation, is then assessed and the inevitable deviation throughout the trend inspected, defined, evaluated and tak-

en into account once future forecasting is done. (Sahu; Hope & Mühlemann 1997, 252-253)

Causal Method – As it is stated in the name of this method, the causal method examines the cause-effect relationship into the development of sales. The affecting factors which shape the historical data of the product can either be internal (e.g. marketing, updates) or external (e.g. taxation, competitors). Regardless if it's a boost or decline in sales, causal methods is used to determining "what might happen" – scenarios. As future business moves are considered within the company with the knowledge of how the possessed competences has an effect on the product demand or what type of changes in sales are to be expected once a new competitor enters the market. (Sahu; Hope & Mühlemann 1997, 252-253)

2.3.2 Qualitative methods

The best description of qualitative forecasting methods comes from it alternative name of judgmental forecasting. In general terms, these techniques employ a group of experienced managers or experts in the appropriate field. Judgmental methods have the advantage of providing preemptive scenarios of the product demand where historical data is not available for various reasons. A good example of the describe situation could be an organization launching a new product into the market. Qualitative methods are to be used in circumstances where essential factors which affected the historical data have changed. An occurrence which would force the government to start rationing goods would be a significant environmental condition change making the product's historical data irrelevant in terms of forecasting. Similar than quantitative methods, there are many ways to perform qualitative forecasting. Market research is commonly known and used feature of a judgmental forecasting. Other known ones include scenario forecast in which different business outcomes are arrived at through assumptions of which the most likely prevailing one is chosen. Subjective approach is basically the idea of a human mind coming to the conclusion of future demand basing the decision on factors which would otherwise be difficult to quantify. Such an analysis – call it "hunch" or "business insight" – is best conducted by a person with broad sense of the business area. (Jacobs & Chase 2008, 252-254; Hope & Mühlemann 1997, 254; Sahu)

2.4 Service capacity management

Although capacity management has already been discussed in this chapter, it is vital to make the distinction between service capacity and manufacturing capacity principals. Service capacity planning is subject to numerous of the similar issues as capacity planning in manufacturing. Therefore, the points presented before are universal in capacity management but in order to clarify the meaning and the difference of service capacity a chapter dedicated directly to its principles is essential. (Jacobs & Chase 2008, 68) Service companies worldwide consider capacity management as the most difficult yet most essential management task. Managing supply to fit demand or demand to fit supply is promoted as one of the key issues of service management practice. The definition of capacity is indifferent regardless of whether the field is service or industrial. Thus, capacity can be interpret as the performance of a technical or economical unit within a period of time which fits both fields. However, this is where one of the major differences occurs; industrial capacity can be measured in product units whereas service – interpret as offer to spend time – gives a more coherent picture when determined in units of required time. (Corsten & Stuhlmann 1998; Jacobs & Chase 2008, 68; Ng & Wirtz & Lee 1998)

2.4.1 Differences between manufacturing and service capacity

Service capacity management is seen as more complex than that of manufacturing. As service capacity depends more on the timing and location of the service, the volatility of demand fluctuation is greater when compared to production capacity planning. In goods manufacturing, the traditional mode is adjusting the logistics and operations management to their full potential through reduction of throughput time. Ideally, organizations would be able to reduce capacity during seasonal lows and increase during peaks. However, this is virtually impossible for services firms with the exceptions of providers which operate through appointments. There are plenty of characteristics which set service capacity management apart from the manufacturing. (Corsten & Stuhlmann 1998; Jacobs & Chase 2008, 68; Ng et al. 1998)

The time aspect was put out before but its importance should be elaborated. Contrary to produced goods, services can only be consumed at the exact point in time – in other words – when they are needed. Furthermore, as the service is provided at the customer's request the producing of the service happens at that moment. Naturally, this is not the case for manufacturing as goods can be produced well in advance and put to stock waiting for consumption. A person can wait to get a new care, but if he is suffering from a severe stiffness of neck muscles he would need an immediate massage. Due to the intangible and perishable nature of services, organizations in the field are unable to inventory its excess capacity as manufacturers do. Moreover, services require a time frame which correlates with the customer's request and quality of the performance. Consequently, if a production line is able to perform with a faster pace it normally increases the efficiency and utilization whereas a timed service can actually lower the customer's perceived quality. Additionally, making customers wait longer will probably result in fewer customers. The complexity comes to show when the "right now" characteristic is combined with the dependency of location forming it into a "right here, right now" deliverable. (Corsten & Stuhlmann 1998; Jacobs & Chase 2008, 68; Ng et al. 1998; Ittig 2002)

In a service setting, the capacity must be situated near the customer as many of the services cannot be performed without the presence of the consumer. Manufacturers have the advantage of producing the good which is then distributed to the client. This practice is not possible for service sector. The capacity to deliver the service has to be distributed before the actual production can begin. The delivery is not necessarily physically executed but such mediums as telephone and internet can provide services. This trend has reduced the location-dependency for such service firms as banks and telephone companies. (Jacobs & Chase 2008, 68; Ng et al. 1998)

The volatility of demand was already portrayed as being of different scale for service capacity than what is for manufacturing capacity. As mentioned before, the inability to hold stock of services leads to the situation where an organization has to have the right amount capacity at the given time at the exact location. Otherwise, a loss in sales (too little capacity) or unused capacity (too much) will occur decreasing the profitability. The task of inventory is to smooth the demand and this is the case for manufacturing whereas impossible in service sector. The great variation in demand set large deviation

to the minimum capacity needed. Customers wanting service tend to have individual demands and different needs which require substandard amount of capacity. An example of the situation could be a dentist drilling a patient's cavity which proves to be bigger than what the check-up had insisted. The dentist had an idea of how long the fixing would take, but now he finds himself in a situation where he has to spend extra capacity because of the sudden change of need hence making the next patient having to spend more time in the waiting room. Lastly, consumer behavior plays a key role in the volatility of service demand. As customer behavior is affected by numerous external factors (fashion, weather, major event) the effect is direct. In Cambridge people have less interest to go punting when it's raining as oppose to a nice sunny summer day. Taking into consideration the sensitive volatility, service managers are recommended to plan capacity increments even at a minute scale of 10 to 30 minutes. (Corsten & Stuhlmann 1998; Jacobs & Chase 2008, 68-69; Ng et al. 1998; Ittig 2002)

2.4.2 Service capacity utilization

The optimal capacity utilization rate for a production unit is naturally 100%; production is flowing with stop at the ideal pace, resources are allocated and used correctly and the quality remains the same. At a quick thought-through, a utilization rate of a 100% would sound ideal for service capacity usage, but is this the case? The best operating point for is not set in stone; Jacobs & Chase (2008) suggest that the point is near 70% of the maximum capacity whereas according to Ng, Wirtz and Lee (1998) the utilization rate of 75% is the optimum target. This rate gives enough time to have the servers busy and have the ability to complete the specified needs and wants of the customer. The universal rate of optimal service utilization is somewhat impossible to define as it is heavily varied by the size and type of the organization. However, both parties agree that once the demand exceeds this point, the service quality has been noted to drop. The zone between the optimal and maximal rate is referred to as critical zone. As seen in Figure 4, above the critical zone lays an area of non-service which actualizes in queuing situation or - in the worst case - customers who don't get served. The key notion of this idea recommends companies to maintain excess capacity in order to fulfill the desires of consumers. Theoretically, it is advisable for a restaurant owner in a village of 70 people

to have seating, staff and food for serving 100 customers. (Jacobs & Chase 2008, 68-69; Ng et al. 1998)

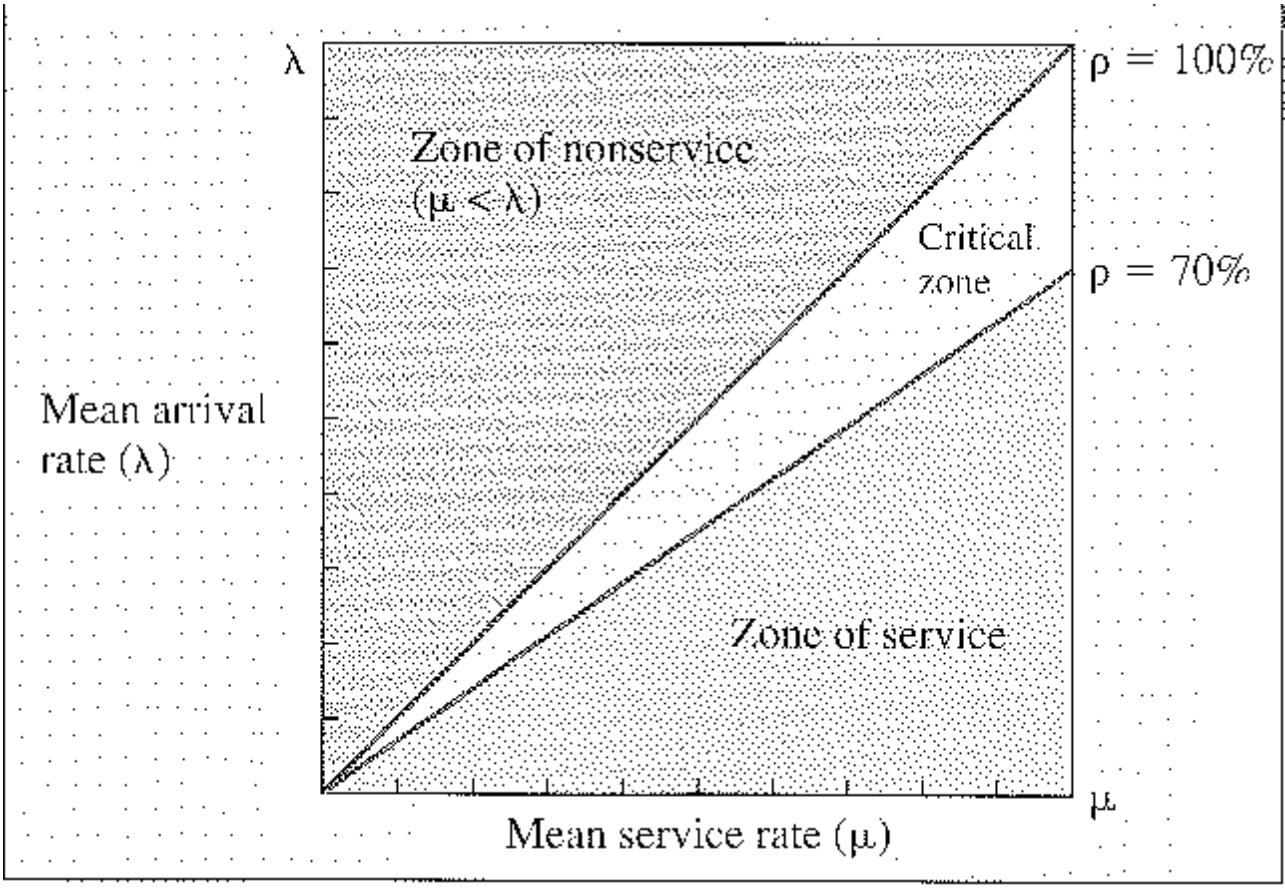

Figure 4. Relationship between the rate of service and service quality. Jacobs & Chase 2008

As opposed to manufacturing, the low utilization rates in service capacity are more appropriate. The gravity of what is at stake in terms of incomplete service identifies the true need of excess capacity. For instance, the before-mentioned emergency services simply cannot operate even at the optimal levels as human lives are lost if the service doesn't reach the consumer due to lack of capacity. Other type of service companies which operate on low utilization rate are on-demand type of service organizations such as tow trucks or elevator maintenance. There are types of service businesses which can plan to operate at a level closer to 100% utilization rate. Predictable services such as commuter trains or service providers which do not need customer contact such as mail sorting can aim for higher utilization. Additionally, sports teams wish to have sellout venues, which would equal to 100% utilization, not only due to profit but because of the atmosphere which affects the perceived quality of the service as well as supports the team to perform better. Sold-out and then crowded facilities do not necessarily boost the

perceived quality. People would much likely travel in a train which has unsold seat. Also, if above mentioned restaurant would only have tables for 70 people, nobody would prefer to be the last one to get seated as the perception of the last available seating introduces an idea of a low quality location accompanied by hasty service. (Jacobs & Chase 2008, 69; Ng et al. 1998)

2.5 Capacity flexibility

The aspect of flexible capacity was briefly mentioned in section *2.2.2 Medium-term capacity decisions*. The vitality, benefits and the opportunities which flexibility provides are truly advantageous thus the meaning, purpose and gains should be elaborated. Capacity flexibility fundamentally means the adaptability of resources facilitating rapid increases or decreases in production levels or shifting production capacity from one product to another without complications in order to cope with fluctuations in demand imposed by the environment. This is achieved through flexible human resources, processes and manufacturing components such as plants. In addition, organizations can seek flexibility through capacity of their suppliers. All of these concepts are a part of the broader concept of organizational flexibility. (Jacobs & Chase 2008, 56; Delarue et al. 2006)

Flexibility of plants lies in their ability of having an absolute minimum changeover-time. Requiring movable equipment and easily accessible and rerouted functions, the adaption to change can happen quickly. An assembly line designed for a single specific product unit is not flexible at all. Instead, the same assembly line should be able to produce items which are within the same size and type range using different quantities of identical parts. If needed, the robots and other tools as well as the whole assembly line could be relocated to another production station if necessary. When process flexibility is discussed, it is done in reference to adaptable manufacturing systems in assistance of easily set up equipment. The goal of process flexibility is to provide low-cost option by permitting rapid changes of process actions. The actualization of having a large variety of different products produced at lower costs rather than focusing on a single product which might turn out to be more costly is referred to as economies of scope. (Jacobs & Chase 2008, 56)

Worker flexibility or manpower flexibility has proven to be needed over the past two decades more than ever before due to the social and economic changes in the global market. Flexibility strategies in labor utilization divide into two distinct approaches of which the most known classification is functional and numerical flexibility. Both of them apply different logic in fulfilling the gaps between supply and demand, but the recommendable way for organizations is to use a combination of both. (Jacobs & Chase 2008, 56; Delarue et al. 2006)

The numerical approach divides further into two subgroups; contractual and temporal flexibility. In contractual flexibility, the size of the workforce is altered to meet to fluctuations in production and service cycles. Positive demand variation leads to hiring extra workers on temporary employment contract or utilizing subcontracting whereas negative demand change leads to laying off employees. Customarily, agency work is more expensive but the skills and competences are guaranteed in contrast to a new employee which has to go through training. It is recommended to use agency labor in uncertain and turbulent environment where demand changes occur on short time frame basis. (Delarue et al. 2006)

Temporal flexibility being the second subgroup of numerical flexibility should not be confused with the contractual flexibilities temporarily hired work force which alters the size of the total work force. Instead of modifying the number of employees, the number of working hours per employee is focused upon. Temporal flexibility means included extra time, flexitime, part-time work and temporary lay-off which were applied a lot in various companies during the recent economic downturn. Altering work hours of employees to meet the demand has its negative aspect. The change might encounter less positive reactions from the workforce. (Delarue et al. 2006)

While numerical flexibility focuses on changing the quantitative amounts of labor, functional flexibility affects the qualitative aspects of employees. Hence, in literature functional flexibility is referred to qualitative flexibility and numerical as quantitative. The functions which the employee is capable of executing are put under the scope. Naturally, a flexible worker has the skills to complete multiple assignments and switch easily between different tasks. Multi-skilled employees can hence cover for absentees or provide excess supply in times of need. The degree of which an employee can be flexible

differs greatly from an organization to another; in a manufacturing plant there can be a person who knows all the tasks on every assemble line. However, in a hospital for instance a neurologist cannot cover for a gynecologist. (Delarue et al. 2006)

It is crucial to keep in mind that none of the manpower flexibility methods exclude another one out. Furthermore, neither does using any type of flexibility rule out the possibility to utilize a second one. Indeed, when organizational flexibility is put to test, the ones who excel have flexibility of all sorts in their capacity selection and when an organization is flexible it can respond to demand faster, better and easier affecting the competitiveness in a positive way.

2.6 Just-In-Time approach in capacity management

Just-in-time approach, although not directly a part of capacity management, can provide great benefits to allocating of capacity by cutting unnecessary production activities and cost while increasing efficiency and improving quality. The new global competition has put forth challenges which have forced companies to focus on the needs of customers leading into improvement of the quality of the output as well as enhanced customer service. Attacking this goal, a method was invented by the Japanese car manufacturer Toyota in order to reduce waste as a means to improve product quality. Just-in-time (JIT) method was born as a result. The technique was first developed in Japan in the 1950s gaining a strong foothold in manufacturing companies worldwide since then. Initially, JIT was developed for manufacturing purposes nevertheless its utilization should not be excluded by the service sector. (Ohno 1988, 4; Canel & Rosen & Anderson 2000)

2.6.1 The essentials of JIT

Just-in-time method refers to company's flow process during production. The product itself is created with the correct amount of correct parts at the correct timing and nothing more. Thus, the elimination of waste, process efficiency and simplicity take place. The scarcity of resource provided the platform for JIT defining anything other than the minimum amount of essential resources, which add value to the final product, as waste.

In this context, extra or buffer inventory is undesired and considerate waste-creating as it both reduces profitability and productivity. Furthermore, what the extra inventory provides is a shelter for defects which unfortunately tends to lead into disregarding of flaws in production flow. By purging stock buffers, JIT exposes the problem areas forcing management to continually control, monitor and improve their processes. Nonetheless, although the ultimate state resulting from successful implementation of JIT would be ideal, it is extremely difficult to apply as production consists of several components. Naturally, the more there are work station and different phases separated from each other, the complexity of execution increases. (Ohno 1988, 4; Canel et al. 2000; Jacobs & Chase 2008, 228-229)

Manufacturing has applied just-in-time process ever since the technique was brought into daylight. Primarily the obvious and measurable applications have made it reasonably simple to employ in a manufacturing environment. The stationary and repetitive nature of manufacturing provides a pleasant platform for JIT principles as the product moves from one phase to another enabling the improvement seekers to optimize time spent in transporting and detect problems quickly facilitating immediate solutions. (Canel et al. 2000; Jacobs & Chase 2008, 228-229)

2.6.2 JIT in services

The service sector has not employed just-in-time method as robustly as its counter-part manufacturing has. As the method was developed for manufacturing purposes, it could be said service companies have neglected JIT to a certain extent. Surely one can find a number of reasons for this, but the difference of the competition of service sector and manufacturing sector provide a solid point. Manufacturing has been exposed to global competition long before services. The vital feature of location in services, as it was presented before, has not experienced as overwhelming need to drive out inefficiency until recently. Other misconceptions about the JIT principles have kept the method out of service management. Such misinterpretations as JIT being a product-oriented system or the incapability to cut production time in services as opposed to cutting lead times in manufacturing, have kept service managers uninterested in applying the technique. Furthermore, the fundamentals of services are thought and seen in humanistic terms whe-

reas manufacturing is technocratic. As a result, manufacturing is perceived as progressive and efficient while service industry has a primitive and inefficient label. (Canel et al. 2000)

In reality, just-in-time focuses on the process and not on the final deliverable. The main idea behind JIT touts seeking absolute efficiency in processes and ultimately producing the good or a service waste-free. If applied successfully, the quality improves leading to greater customer satisfaction. Therefore, if just-in-time can be utilized in diverse manufacturing environments under these principles, the applicability should extend to non-manufacturing activities. (Canel et al. 2000)

While the majority of JIT literature and research concerns the manufacturing aspect, it is arguable that service operations have at least equal or even better applicability to JIT. As services are perishable and intangible, the finished goods inventories lack totally. In addition, the service product is handed at the request of the customer thus avoiding work-in-process status which is typical for manufacturing. The value-adding processes are what JIT focuses on. Conveniently, the biggest productivity gains in services come from determining the vital service activities which add value to the product. Throughout the described process, the actions which are fundamentally futile can thusly be eliminated. The benefit of this procedure leads into simplified production processes which in turn heighten the quality. Furthermore, employing JIT enables companies to cut costs. The reality of low cost and high quality product would hence actualize boosting the competitiveness of the company. (Canel et al. 2000)

As there are features which promote JIT use in services over manufacturing, services sector face issues which do not concern industrial production in applying just-in-time technique. JIT was developed alongside production operations which were repetitive and the end products were homogeneous. The customers' demands for services vary from one to another so the same procedure is hardly repeated identically making the products unique and therefore heterogeneous. JIT encourages services managers to isolate and simplify the processes so that repetitiveness may actualize in production. Isolating and standardizing production phases help to pinpoint the improvement needing areas and attaining the problems requires less effort. It is advisable for services to move towards offering a more homogeneous product if possible. In services businesses which

are not capable of this due to a completely unique products created on-demand should seek ways to offer a heterogeneous service which is pieced together from homogeneous particles and activities. Flaunting the elimination of the unnecessary, cutting cost by getting rid of activities can easily backfire. Striving for efficiency, cut-backs can expand to field which jeopardize the competitive strength. Efficiency will thrive in the short run making the decisions seem right at first but in the long wrong the quality is affected and the ability to respond customer demand is compromised. Setting services apart from manufacturing, quality control has a vital role; after creation the product can be inspected in manufacturing process before it is delivered to the customer whereas in services customers are in contact with the production process having the privilege of having the first-hand information and experience of the quality. For that reason service need to emphasizes the criticalness of process monitoring because customarily they do not deal with a physical product which would be suitable for inspections. Lastly, the complicatedness of measurement of service quality and productivity impose a hindrance in employing JIT. Unless a valid measurement methodology is introduced no actual gains can be documented which totally prevents the monitoring of results and identifying progression necessities. (Canel et al. 2000)

2.7 Aggregate planning

Looking at a larger scale of organizational functions, capacity management and planning is merely a portion of it. Operational managers provide their peak performance through efficient capacity management. However, the combination of company activities creates the overall efficiency. Integration and cooperation between marketing, distribution and logistics, operations, finance and product development and their individual plans create what is called an aggregate planning. Excelling in just some of the areas keep the firm from having a balanced supply and demand level, which is the ultimate goal and purpose of aggregate planning. Therefore, the importance of cross-functional communication is to be highlighted. The planning horizon is identical to capacity decision timeframes, dividing the planning ranges into long-, intermediate- and short-ranges. (Jacobs & Chase 2008, 285-287,299)

Aggregate planning can be seen as a step taken from strategic capacity management towards operative direction as figure 5 (Jacobs, 286) suggests. Consisting of separate units, aggregate planning delivers better results, the more specified and standardized single operations are. Piecing together these units, aggregate plan translates company strategy and capacity plan into demand-matching supply of broad groups of labor force size, inventory amount and production levels. (Jacobs & Chase 2008, 285-287,299)

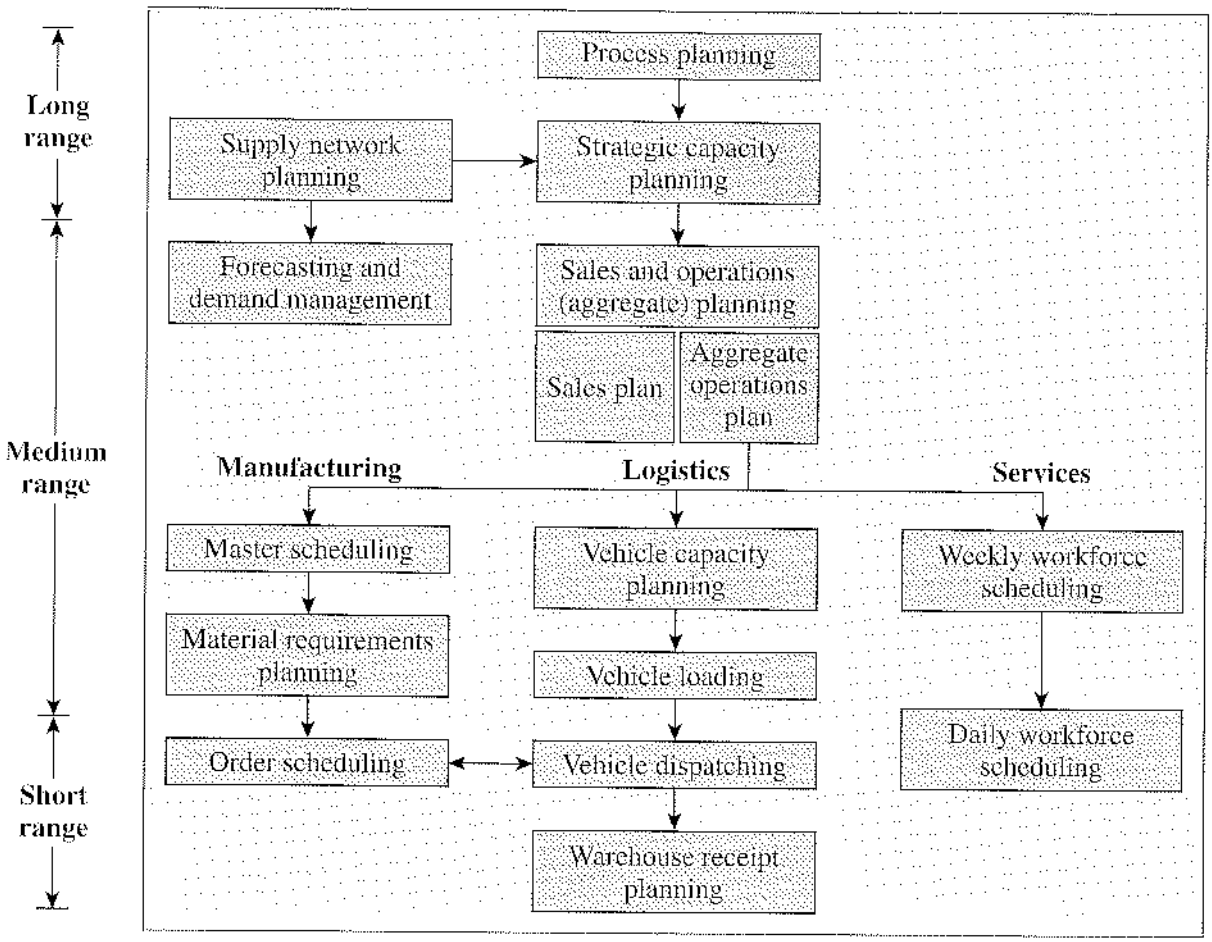

Figure 5. Overview of Major Operations and Supply Planning Activities. Jacobs & Chase 2008.

3. CASE STUDY: SUPPORT SERVICES GROUP LTD.

The purpose of this chapter is to shed further light into the company as well as the problems which have lead into writing this thesis. The company's services, organizational structure and products are explained however, the scope being on the capacity related problem areas. Company's structural division, services and products will be defined while focusing on a specific product and two separate divisions.

3.1 Company introduction

Support Services Group is a privately operating company providing security and risk management services to both public and private sector. The company's mission statement is: "Protecting our Partners – through the consistent delivery of an innovative risk and security management support service solution comprised of a highly developed portfolio of complimentary products. " (Support Services Group 2010). It was established in April of 2000 as an actualization of dissertation of the owner and managing director Craig Wiltshire alongside friend Guy Dungworth. Both of them are still the current sole owners and executive managers of the organization. Founded originally as Security Guarding Solutions Ltd., the company obtained its current form in 2010 after acquiring Unit Group Ltd., Avon Protection Systems, and Astute Security Ltd. merging them into a single unit under the name of Support Services Group Ltd. The company employs over 400 people throughout the United Kingdom while maintaining a national office network with bases in Swindon, Derby, Glasgow and a 24-hour control room in Bristol. The main office located in Swindon handles the majority of the administration. The company is seeking further expansion which is expected to take place - according to current estimates - during 2012. (Grall, 2011; Stahlsted, 2010; Support services group, 2010)

The divisional organization structure of SSG depicts how power and responsibilities are allocated within the company. All the divisions have their unique purposes and functions. In total Support Services Group Ltd. has 5 divisions including Operational, Service, Partner, Systems and Solutions (consultancy) divisions which all have their own

management, although the final decisions are made by the executive managing directors of the company. Due to lack of relevance to the thesis subject the Partner, Systems and Solutions divisions are not discussed further as the research problem does not concern them but in a mere indirect way. The organizational structure of the operational division and the service/administration division can be seen in figure 4.

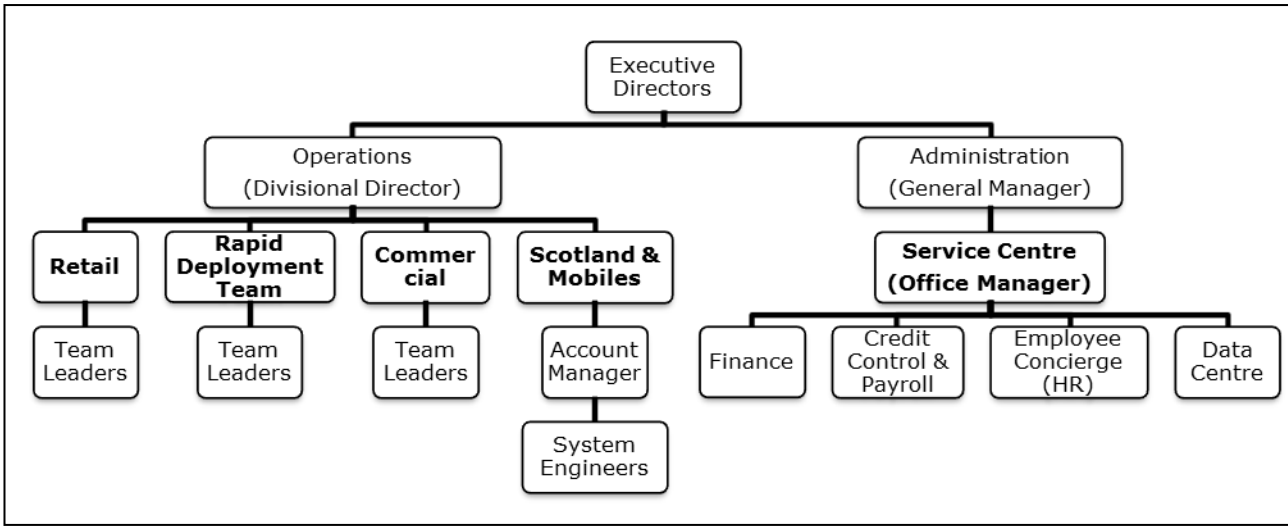

Figure 4. Organizational structure of Support Services Group. (Support Services Group, 2010)

The operational - also referred to as guarding - division consists of a Divisional Director, account managers and team leaders. The Divisional Director is the executive manager of this division followed by account managers who are in charge of the client contacts. The security officers are the ones who carry out the operational functions. Their immediate superiors are the team leaders which control the allocation, recruiting and controlling the delegation of other operational functions to the correct officers. In turn, the team leaders are obligated to report their actions to the account managers. The team leader cannot authorize decisions which directly affect financial figures as these proposals need to go through the account managers. The co-operation between team leaders and their supervisors are planned to match clients' demands and expectations towards the service.

The four branches; Retail, Commercial, Scotland & Mobiles and Rapid deployment service (formerly known as Rapid Deployment Team as shown in Figure 4.), provide manned guarding, mobile patrol services, key-holding and access control. The retail product has two team leaders and the commercial product has one but both of them

share the same account manager. The offerings of both portfolios are mainly concerned around physical guarding. The Scottish portfolio has one account manager and one team leader. It is a more specialized branch omitting the basic guarding solutions focusing on the patrolling, key-holding and access control services. In addition, they dedicate themselves to CCTV security technology performing camera and other security equipment installations as well as maintaining and repairing them. Lastly, Rapid deployment service unit is the company's latest product which came to be in 2009. This product is also the main focus of the thesis problem statement thus its functions will be elaborated.
The administrative tasks of the company are managed at the Swindon-based Service Centre. The office currently holds 7 office employees, an office manager and a general manager who is the executive director of the administration branch. The office manager controls the efficiency and fluency of the administration while being the key link between the account managers and the office personnel. The general manager's responsibilities are the strategic executions of the office and consulting with the managing directors as well as other executive directors of different branches. The office personnel carry out the operative administrative tasks which consist of four main groups; finance, credit control & payroll, human resources and data management.

The company accountant and business controller are the two persons who are responsible for the finance department, ensuring the company cash flow, billing and invoicing, accounts and payments. Credit control is performed cross-functionally between the general manager and finance department much like the payroll management is done by cooperation involving finance controller and the Employee Concierge. The finance department is responsible for issuing the actual payments for the payroll whereas the Employee Concierge gathers the data; employees and payable amounts, and sends them onward.

The primary tasks of the human resource department are payroll - as mentioned before – and providing employee help-desk services linking the guards directly to administration without having them go through their superiors first. As the actual recruiting is made by the team leaders, the left-out part of the recruiting process for the Employee Concierge is to enter the new employee's information into the company-wide internet-based People Hours database system. Other functions of Employee Concierge are the induction process for the new employee (contract and other necessary paperwork), uniform

orders, investigating employees' wage, holiday and expense queries as well as writing employee references.

The data center takes care of gathering the employee worked hours and recording them into the People Hours system. People Hours holds the site information, employees and their worked hours from which the data manager can provide analysis of revenue. The employees are required to send in their worked hours in form of standardized timesheets which are validated by the site manager's signature. The data collector is required to chase the security officer if the contracted hours, indicated by People Hours standard, are not fulfilled. Afore described case may end up in lost or late revenue.

As the departments take care of the function, the administrative loop completes itself. Once a security officer completes his week, he sends in the timesheet. The validated hours of the timesheet are entered into People Hours giving the permission for finance department to invoice the client and Employee Concierge to record the payable amount to the officer which is issued once the payroll is closed. The invoicing of clients are not fixed and depending on the account, it is carried out in cycles of weeks, months or SSG's own cycle which varies from 4-5 weeks. The payroll is executed similarly although, there are more pay cycles than there are invoicing cycles. In addition to invoicing cycles, there are two types of cycles which function on fortnightly basis.

3.2 RDS – Rapid deployment services product

Formerly known as RDT ("Rapid deployment team" as seen in Figure 4.), the RDS portfolio has grown into the biggest product which Support Services Group offers currently, generating approximately £50,000 on weekly basis in sales revenue. The product was founded in order to respond a specified demand from customers. The companies in the field of security services are surprisingly taking a very little action if any towards the main principle of rapid deployment service. RDS operates through on-call principles as an emergency cover service for companies (and other SSG portfolios, namely Retail and Commercial) in need of immediate guarding in case an event which requires extra manpower or simply if their regular guard is absent. The request for a security service

come in all timeframes; a client may call in to request a service for as long a period as a month or even at a short timescale of less than 24-hour notice.

Because of the size of the RDS product, the portfolio is controlled by two account managers and four team leaders. Founded in 2009 out of necessity to provide on-call service to rapidly emerging demand, clients found the product extremely suitable and hence it has grown considerably quickly and organically into the main product of Support Services Group. The most notable clients using this product currently are fast-food restaurant chain McDonald's, a convenience store chain Martin McColls and other security service companies such as Balfour Beatty and Sunwin Management Ltd. who for various reasons choose to use an external supplier in completing service their clients have requested from them.

RDS differs from other operational products in the aspect of data collection. Whereas officers in other guarding branches send in their weekly timesheet, the service center receives the RDS worked hours in an excel spreadsheet put together by a team leader who matches the purchase orders from the client with the worked hours of an employee. Furthermore, Sunwin Management (a client whose share of the RDS revenue is roughly 30-40%) sends in their invoicing summary which indicates the hours they validate to be invoiced from them by SSG's service. Therefore, the data manager has to match the team leader's information with Sunwin's data. Discrepancies are inevitable considering and require further investigations done by data manager, Employee Concierge, account manager and/or team leader.

3.3 Problem areas of RDS

Seeing that the RDS portfolio has been introduced and presented with the necessary amount of information, the focus point is aimed at the very reasons which lead into creating this thesis; the issues which prevent a successful implementation of the product. The problems that are illustrated present the issues which capacity management tools are able to tackle. Matters that cause difficulties irrelevant to capacity management, such as marketing, are not discussed. However, it is recommended to conduct further studies and research that facilitating the optimum utilization of the RDS product in all business aspects.

3.3.1 Capacity management difficulties

The problem-causing harsh reality of the Rapid Deployment Service product is totally omitting capacity planning. In an interview conducted in June 2011, the General Manager Antony Monaghan admitted that capacity planning for RDS is not happening at the moment. Evidently, being the root of major difficulties, lacking of a capacity plan sets a grand uncertainty of the future and current status in terms of a successful and a profitable company. Subsequently, the existing circumstances are furthering the current position into a point which other setbacks are derived from. As the company is looking to expand in the near future, even catastrophic turns can emerge if no actions are taken. Making the present and what is to come unclear, the idea of measurement of performance does not actualize except in financial figures hinting the problematic situation as well as inefficiency. However, these numbers cannot provide a pin-point view of what exactly is being done wrong. For instance, the capacity efficiency and utilization indicators are unable to exemplify the much needed figures as effective capacity nor design capacity are not determined. Nonetheless, having the ability to start undergoing an expansion, it is fair to assume that capacity is plenty which then leads to low rates of efficiency and utilization.

A simple explanation is offered to why the capacity plan fails to exist. No resources have been allocated to compose such an arrangement. Forecasting of future sales has been allocated to Managing Director Craig Wiltshire and to Operational Division execu-

tive manager David Stubbs, but further outlining of needed capacity to match the predicted demand is not assigned to any employee, manager or team. Capacity (in this case meaning recruiting of new employees) is added continuously without enough consideration of the location or flexibility of workers to provide a false idea of the company's ability of being able to create sufficient supply. The situation develops a problem where security officer with no shifts – idle capacity – become unsatisfied and displeased with the company. This results into officers wanting to leave the company which requires capacity from the administration to process their request and paperwork.

In addition to capacity management problem, the flexibility aspect and determining the level of capacity adaptability is causing obstacles. Candidates for security personnel work are hired regardless of their level of flexibility. Security officers who are unable to be available 24 hours a day 7 days a week or to travel for work are decreasing the level of capacity flexibility. Although the amount of service capacity may be adequate, the location or timing can originate obstacles.

3.3.2 Product related difficulties

In addition to capacity management related problems, the Rapid Deployment Service product itself is to be examined. The assessment will provide valuable links between the product and capacity planning obstacles and lead to the sources which hinder the efficiency, productivity and ultimately profitability. Once the processes, resources and methods relating to capacity planning are determined, the grasp of the improvement needs can be taken.

While the product was developed to respond to popular demand, its growth turned out to be fast and organic but uncontrolled. The soaring demand and the capacity additions are not done in correlation to each other. The recruiting is an on-going process and candidates who pass the essential requirements (UK Security Industry Authority licenseholder, clean background and detailed work/study history from the past 5 years) are hired even without an idea of the necessity of the employing or a clear idea of the sites and/or shifts that they would cover. In the worst case, an employee is hired but there are no shifts or sites available for him.

The fast and uncontrolled growth has made the product grow out of its efficient proportion and while the revenue has increased, the profits have not. As new contracts from the clients have emerged, the need for management has lead to a point where RDS product has three account managers and four team leaders. As a comparison, it is worth pointing out that Retail portfolio has one account manager, who is also in charge of Commercial portfolio, and two team leaders. Furthermore, the other team leader splits his time between the Retail and Scottish portfolio. Comparing financial figures, RDS grosses an estimate of £40-45,000 in weekly revenue. The same number for Retail is £35-40,000. From the view point of management resources per revenue, RDS comes out tremendously inefficient.

Due to an expanded management, overlapping of task management creates problems. The division and delegation of managerial duties is not clarified thoroughly enough deriving into a situation where the needed focus of a task is omitted which ultimately leads to data entry errors. Mistakes in data gathering leads to incorrect pay amounts causing a reverse engineering effect. After the employee has phoned in his pay query to the Employee Concierge, the message is then forwarded to the account manager and team leaders (assuming that the mistake didn't happen in data entering) who are forced to go over the data again. The capacity is therefore wasted on issues caused by inefficient process.

4. CAPACITY MANAGEMENT AND PLANNING FOR RDS

The chapter 2 discussed about the different steps in capacity management and planning in a theoretical sense. This chapter takes a sturdier hold on the practical aspect of capacity management going through the necessary steps in initiating capacity management process and to point out where improvement needs in areas which are capacity deficient. The idea behind the chapter is to actualize the current capacity situation by bringing up problem-causing issues and producing a platform from where Support Services Group can start their capacity management process.

4.1 Evaluating and estimating existing capacity and future requirements

Throughout its existence, the clear definition of the amount of possessed capacity has not been clarified for RDS. Furthermore, when initiating capacity planning process the first step primarily is a look into the future demand. However, due to the ambiguous quantitative values, determining of the current standpoint and the ability to respond to the demand at-hand is seen more important. Once a type capacity platform is established, a detailed approach for assessing the future requirements can be taken. The main focus will be on the operational level of the service that concerns the security officers and the work sites. The data was taken from the company database system People Hours in August 2011. Microsoft MapPoint program was used as an aid to provide visual clarification of data along with all the maps included in appendices.

The available capacity can be seen as the guards which are listed in the database. The data provided by People Hours indicates that the RDS portfolio has the information of 477 individuals, who are either contracted employees or persons have yet to sign the contract but are going through the induction process. It is worth pointing out here that although their information is listed in the database, there are no guarantees that they would be doing or have done any actual shifts. The physical locations of the personnel can be seen in Appendix 1.

While the location and amount of available workforce are determined, the same is done to the contracted sites. The sites display current and future demand. The number of RDS sites in People Hours is 1118. Evidently, the number is much larger than what the number of currently active sites is. The reason for the number being so high is that amongst those are sites which signed a contract in 2009 when Rapid Deployment Team was founded. Moreover, sites which have made a contract but are not using the service actively are listed there. The negative aspect naturally is the distorted and unrealistic figure but what is positive is the fact that old clients will not have to draft a new contract if a need for immediate security service emerges even though their last service use was 2 years ago. The location which are listed but inactive in terms of working shifts, provide an aspect to possible future demand. Moreover, sites using labor on daily or weekly basis do not have contracted hours and they are due to variation at the shortest timescales. A possible scenario is that an employee shows up to a site where he learns that he would be needed for no longer than 3 hours. Active marketing to old clients could restructure once existed demand. To illustrate the locations of the sites, the same method is used which was used for the staff. The result can be seen in Appendix 2.
The combination of the two maps (Appendix 3) provides a good starting point of demand and capacity. The illustration gives an idea of capacity needs. However, the data at-hand merely displays the location-related needs of the capacity and existing demand. More realistic demand is to be sketched and the flexibility of capacity must to be determined. Furthermore, presenting the location on a map which covers the whole United Kingdom is too imprecise. Aiding more accurate reading of the locations, Appendices 4-11 provide focused images of these points. In these images security officer residences are depicted as yellow pins and work sites as blue circles. Each map also has scale of distance in the upper right corner. This measure helps apprehending the distances as some sites seem to be located where there are no security officers nearby. The distance measure therefore indicates the needed flexibility for capacity.

4.1.1 Forecasting future demand

Ever since the company was founded, it has relied on judgmental method in providing analysis on the future demand. Future requirements have been determined as a result of actual sales. Currently it employs the skills and expertise of Managing Director Craig Wiltshire and Operational Director David Stubbs. The forecasting process goes hand in hand with sales as they seek opportunities (e.g. fairs) to identify clients and start networking. The most important part is the conversion where the seized opportunities are transformed into business. Current trend sees future company-wide opportunities at £25 million whereas conversion has been able to apply at a level of 8%. This scenario is based strictly on sales according to the qualitative forecasting method. However, a quantitative aspect should be taken into consideration as it can provide estimates which the judgmental method might omit.

The figures above where predicting for total future demand of the company. Rapid Deployment Service product, or any other product, has not been targeted for an individual forecast estimate. Reasonable template for forecasting changes in the RDS demand is time-series analysis. The reasons for choosing this alternative lie in the data which has been recorded accurately. Furthermore, as RDS has experienced fast growth, development and expansions, the causality of the history would be extremely difficult to determine as employees, clients and overall condition have changed at rapid pace.

The maps found in Appendices 12 to 19 illustrate the growth of demand. They are divided into 4 month periods starting from the beginning of 2009 when the RDS was implemented and ending at the end of August 2011. The green triangles are work sites and they increase cumulatively according to the start date of contract. Assessing the three first illustrations (Appendices 12, 13 and 14) representing the whole year of 2009, two major growth centers can be pointed out as well as three minor ones. The area of Yorkshire in northern England including cities Sheffield and Leeds built up demand tremendously during the annual period. The other major growth center was quite obviously London and its surrounding area. The three less significant demand localizations were located in cities of Bristol, Nottingham and Birmingham.

The demand change for the following year (Appendices 15-17) creates slight differences to conclusions which were drawn out of 2009. Whereas demand in the London area has kept growing, the Sheffield-Leeds region has stalled. Subsequently, sturdy demand has emanated in Manchester and Glasgow accompanying them Nottingham and Birmingham region have grown steadily. A new minor demand center has appeared in Newcastle and although Bristol and its surroundings have gained more sites, they have emerged quite scattered and centralization is no longer a fact.

The two last 4 month periods don't bring drastic changes to the trend detected from the 2010 figures. Manchester-Liverpool are kept growing and the combined demand of that and their neighboring Sheffield area are on the verge of creating a demand center equal to London region. The southeastern coastal line has develop somewhat of a demand pattern but other than that, the nonurban areas don't have significant demand formations and the site locations are merely spread out randomly.

As a conclusion, the time-series analysis method implies a growth in major city areas. Therefore, it is expected to have a steady demand or even growth in these areas. Neither judgmental nor time-series analysis can provided reliable analysis on the demand changes in rural areas. What could be done at this moment is to affect the demand according to business strategy. The focus of marketing could be targeted to create more demand in these demand centers of major city areas. The demand in these centers can change rapidly due to external factors (a current example is the rioting experienced in the English cities in August 2011) creating capacity needs of notable amounts. Rural areas are not due to as much change as population is lower, crime rates are lower yielding less need for security services. Whatever the future business strategy, the capacity supply is to be managed accordingly.

4.1.2 Assessing supply

A functional capacity management requires a supply which matches the demand. This is one of the fundamental reasons to uphold capacity management practices. Therefore, supply should always be planned to correlate the forecasted demand while remembering to have the flexibility of supply at a level where rapid changes in demand can be met with increasing or decreasing the supply intensity. The future supply needs can be directly derived from the expected sales levels. However, while evaluating supply needs for the future, it is reasonable to take a look into the previous performance in order to see when or where supply has been insufficient. In the case of Support Services Group and its RDS portfolio, insufficient supply can be detected by two nominators. Firstly, the times when a request from client has gone non-serviced due to capacity deficiency and, secondly, the times when subcontracting is used instead of using in-house manpower capacity. Although agency work is a flexibility measure, generally it is the most costly option thus seen as ill-maintained capacity.

What would be an easy option to evaluate capacity performance in terms of supply by recording unsupplied demand, lacks completely as a method of performance indicator of SSG. When a (possible) client makes a demand and, although trying, the possibility to answer this demand fails, the data of this is not recorded. Team leaders who take the requests and allocate the shifts are not keeping documentation or informing administration when such a situation occurs. However, the subcontracting usage is documented thoroughly and therefore it can be assessed.

Appendices 20-26 reveal the usage of subcontractors per month from January 2011 to July of the same year. The green triangles indicate the location of the site where agency work has been used in the given month. The distinction of how many shifts the agency worker has completed at the site is not expressed as it is more important to find out the key areas where subcontracting seems to be an on-going trend. It is fairly irrelevant whether it is a 7-shifts-a-week duty or one 4 hour cover at the location. Regardless of those factors, subcontracting is a sign of capacity deficiency if it is to take place throughout consecutive months. If such a trend emerges, the company could easily hire more permanent staff at the given areas to increase profits and capacity efficiency. If an agency worker covers two days a week at a specific location, a part-time employee can

be hired to remedy this defect. The optimal situation for subcontracting usage is when the resources to allocate an in-house guard exceed the monetary value of agency work. An example of such a situation would be an event which takes place in a remote location for a period of few days. The travel expenses and the possible pay rate increases which the in-house work force requires in order to complete the duty could even match the rate of subcontracting option. Especially if the order comes in at a last minute, the amount of resources put in arranging the needed capacity could in fact turn out to be inefficient. Furthermore, forwarding this order to partner company enhance the relationship which in turn guarantee efficient temporal manpower flexibility for future occasions.

A closer look into the subcontracting maps reveals that the London and its surrounding area are well-maintained. Despite the beginning of the year, considering the size of the area in terms of population and commercial premises, the capital region is relatively capacity efficient. However, rapid changes in environmental climate are more drastic in the area mainly because of its size. An incident such as the riots of the summer of 2011 results in increase of security services. As mentioned before in the theory section, the service providers who deal with fundamental well-being of humanity shouldn't aim for 70% service capacity utilization as the customers at the critical zone and especially non-service zone could experience crucial hardships as an outcome. Therefore, it is recommendable to increase workforce capacity flexibility in the area as an attempt to provide service to as more customers although it hinders the service efficiency rate.

Another good example of well-executed capacity management can be seen in the development of Birmingham area. Starting from January (Appendix 20) the area was using considerable amounts of agency work, which however systematically declined and practically vanished by June-July (Appendices 25-25). In terms of capacity management, a closer inspection and analysis is to be conducted on how this was accomplished. If the reason is that the demand decreased that can be taken as a warning example of what incompetent capacity management brings forth. On the other hand, if the number of clients and sites have remained the same or even increase, it is fair to assume that it has been due to proactive capacity management executions including such flexibility measures as recruiting (contractual flexibility), shift allocation (temporal flexibility) and

putting an effort in answering the demand by adjusting the supply rapidly and in correlation to one another.

A pendulum effect of subcontracting usage can be seen in Nottingham district. From January on until March, the agency work was growing in numbers. April 2011 (Appendix 23) showed no sign of subcontracting but there on agency work was used again. Out of these seven months, June 2011 (appendix 25) indicates the greatest amounts but it is relieving to see that the trend did not continue until July (appendix 26). This on-off effect is to be examined closely.

The demand trends which can be seen in Appendices 12-19 suggest that neither of these regions has experienced loss in demand. Therefore, the Birmingham area has indeed excelled in capacity management whereas Nottingham has experienced both success and deficiency in subcontractor usage. The actions carried out in Birmingham area should be used in other regions as well. As the used methods have proven success, the Birmingham approach is to lay down an example template of capacity management which is to be applied in less achieving districts.

Examining the maps of the appendices 20-26, the following is revealed. Areas which clearly show the need for regular staff are: Manchester and its immediate surrounding region, Glasgow, Bristol, Southampton and the region between, as well as the cities themselves, Plymouth and Exeter. What can be seen as reasonably troubling is the considerable importance of such areas as Manchester and Glasgow in terms of the whole economy of the UK, which has not been matched by efficient capacity management from the part of Support Services Group. A clear trend of agency work being used in these areas can be seen from the maps. As it cannot directly be seen as inefficient use of capacity as agency work is a capacity mean, the inefficiency can be detected as lost revenue which could be rectified with better capacity management. Moreover, the steps to do so are not demanding but relatively simple: hiring more staff to cover the shifts which are now completed by subcontractors.

Similar behavioral patterns can be detected in the areas of Bristol, Southampton and Plymouth-Exeter district. Although less significant considering the amount of subcontracting and total revenue in comparison to Manchester and Glasgow, these areas further

the realization of inefficient capacity planning. If the company would suffer from lack of resources, it would be understandable to have either the large areas (Manchester and Glasgow) or the smaller regions (Bristol, Southampton, Plymouth/Exeter) experiencing lack of capacity. However, the resources for capacity management are plenty so the mishaps could be even interpreted as incompetence.

Depending on the approach method Support Services Group would find more suitable for its strategy, they could start either tackling the smaller areas or focus on the larger ones. As JIT methodology suggests, separating and standardizing activities improve efficiency and give a clearer view of the total picture facilitating the management and planning of the capacity. In theory, the smaller areas are found easier to manage which results in good capacity efficiency. Subsequently, the growth in those sections is tougher as the market is rather limited and entering a new area requires resources. Entering a new location means entering a new market which brings the management back to beginning. However, the benefit of undersized area strategy is the steady growth possibility as once gained markets are simpler to control. The benefits of larger areas are somewhat opposite to its counter strategy; large sections can experience rapid growth as well as downfalls in shorter amount of time. This requires well maintained, up-to-date and flexible capacity management in order to prevent collapses from happening. Capacity efficiency rate is lower in a realistic yet successful setting because the crucial flexibility comes from a buffer capacity leading into relatively larger amount of idle workforce. Thriving large area strategy can prove to be very beneficial as being a top service provider in a major key area gives a good reputation to the company on which to build on future possibilities.

In conclusion, it should be highlighted that putting your eggs in one basket is always a bit risky. The same applies for these two strategies; it is sensible to use a mix rather than start focusing on one or the other. If one of the options proves to be widely unsuccessful, cutting off the loose ends is to be considered and the areas which are experiencing fundamental deficiency could be transferred to a subcontracting partner company. In repetition, what is reasonable to highlight here is that regardless of the approach method the clients' demand is supplied – not denied – but the flexibility measure is different. Regardless of what kind of numerical flexibility (agency vs. in-house) the supply consists of, the key point is to serve the customer and also ensure the customer's accessibility to receive service in the future.

4.2 Actions towards comprehensive capacity management

The previous chapter expressed what would be the first step for SSG in commencing an active capacity planning and management. Those actions are universally valid and therefore applicable for any other business. The results and improvement areas as outcomes of the conducted research affect the next steps in capacity planning process. However, as the thesis focuses on setting up a capacity management platform from which the company would initiate their process, the tangible quantitative measures are not sought after. The focus of this chapter is to lead the person who would take over the capacity manager position at Support Service Group, on the right pathway.
The RDS portfolio capacity management as a company-wide process has direct links into financial performance. Therefore, after existing capacity and future requirements are clear, a financial analysis of the requirements is to be conducted for mapping out the company's current capacity in the matter of financial possibilities. Company in growth has to be very careful with keeping its cash-flow stable. Analysis regarding when it actually is more sensible to use agency work (as mentioned in an example under 4.2.1) rather than in-house guarding along with what is the cost of idle capacity as buffer and other qualitative issues, set examples on where the financial assessment can commence. Idle capacity is linked to administration costs and the more idle capacity there is the more there are administration resources used because an employee who does not get enough shifts is more probable to leave the company. By determining the administration costs linking into idle capacity, the optimal amount of "workforce buffer" can be estab-

lished and the ideal capacity rate resolved. This can be looked at as one aspect to shape the company strategy. Does the company want to be a low indirect (admin etc.) cost/ high capacity efficiency unit which could result in more customers falling under the zone of non-service (Figure 4) or high indirect cost/low capacity efficiency business bent-on serving all clients.

After these steps, the selection of the most suitable alternative can be implemented. Starting from the implementation, the results have to be monitored. Analyzing the results enable the managers to back-engineer the process and alter the approach method into a more efficient and profitable option. The monitoring can never go into a halt. Even if the results reach prime levels and stay there, unexpected changes in market require regular reassessing the capacity strategy for it to be able to undergo reforms when needed.

5. CONCLUSIONS & RECOMMENDATIONS

The information and observations mentioned in previous chapters clearly indicate serious short-comings regarding Support Services Group's capacity related activities within its Rapid Deployment Service product. The major issue inevitably is the lacking of capacity planning and its management as a product-optimizing process. Furthermore, the direction where SSG is heading - which is expansion – can bring forth grave problems if capacity management continues to be withheld from implementing. A prompt action towards the implementation is to be taken, otherwise – and in the worst possible case – SSG may find itself in a position where its profitability will be at stake even though the gross revenue continues to sore.

In its brief existence, the RDS product has transformed from a value-adding factor to the flagship product of the company. The growth has experienced has been relatively fast and excessive but also uncontrolled. In order to implement capacity control, the large ambiguous entity of RDS needs to be separated and standardized into smaller units. One big entity is relatively difficult to manage and normally inefficient also. Furthermore, the monitoring and managing of these smaller particles simplifies the process while creating a situation where the resource capacity needs can be determined more accurately. Thus, the allocation of correct competences, tools and personnel becomes simpler as the total visibility of the product increases making it more effortless to have control over the product and eliminate waste, increase efficiency and broaden the capability to adapt to an ever-changing market environment. The separation can be done in many ways; assigning team leaders to specific areas with specific guards, dividing the portfolio into sections by separating clients (McDonald's, McColls, Balfour Beatty etc.) from each other or even subtly lobbying the possibility of standardized hours for regular clients so that their sites could be detached from RDS. These operations lead the company closer to the desired Just-In-Time methodology.

The process optimizing nature of JIT method requires total visibility and vigorous information flow within the company. The lacking of record of denied clients is a great disadvantage to the company hindering the possibilities of future capacity planning as the information of the timings, areas or the request-receiving team leader is omitted as a

performance measure. The idea of implementing a call center to which the clients' calls would be directed and from where the message would be put forward is already in place within the company. The call center would not only increase efficiency but also measurability and give new options for capacity monitoring and control. Suggestion in the JIT perspective does not limit to generation of completely new means but also promotes to increase efficiency of the current situation. JIT requires sufficient amount of flexibility from the resources, otherwise come a minor obstacle, efficiency suffers and waste occurs. The impact of this can be experienced on the efficient levels. If the inefficiency is a leading trend within the on-going process, waste merely affects the lead times of the operations.

A service organization seeking readiness to supply demand even when it occurs suddenly has to aim for flexible capacity. Responding to rapid changes in demand is unattainable if the workforce capacity is not adaptable enough unless the company is willing to use agency work which in turn would be more costly and eat up profits. However, the idea is not to make an immediate halt on subcontractor usage but to drive it to an absolute minimum. In a controlled process in which detecting flaws in capacity management and fixing those as they are noted is possible, agency work can be eliminated completely. Firstly, the agency workers, who have been working regularly on the same site for a considerably long period of time, have to be replaced by contractual employees of SSG. Subcontracting is to be used as a temporary measure to ensure flexibility and efficiency. For longer term usage as well as in areas prone to rapid changes or suddenly emerging demand, subcontractors should be the latter choice of the contractual flexibility options. For instance, the type of demand-subcontractor usage rate in Bristol is alarming, cost-inefficient and in direct correlation to actual profit. As the profit margin of the company is roughly 5%, RDS generates 50% of the revenue and its agency work rate reaches occasionally 10% cut on total revenue, the profitability is – as said before – at stake. The situation in areas like Bristol and Southampton has to be assessed at the earliest possibility and the necessary actions, namely increasing flexibility by hiring guards within the region, are to be taken. Normally, security officers aren't to be recruited unless shifts are guaranteed in order to prevent waste of resources. However, in larger areas (e.g. Manchester and Glasgow) where suddenly emerging demand increases the need of workforce substantially, the excess capacity is recommended to be relatively larger in comparison to smaller areas. This would not only facilitate capacity management but

also marketing as the more sites and clients can be served in areas where possible demand immense.

As another flexibility measure, employee profiling at hiring is to be implemented. When a person leaves the company, they are to be replaced by equally matching individual so that loss and inefficiency won't occur. Employees can be awarded for their levels of flexibility, which is currently being done but not in a standardized manner. In example, the median pay rate for security officers is £6.25/h. If the employee is willing and capable, their pay rate can have an increase of £0.25/h per needed flexibility. The most desired attributes are 24-hour availability and readiness to travel within a 50 mile radius. During induction, these traits can be amended to database and the guard made aware of the factor for what he is getting paid for. Inability to carry out the promised features would drop the pay rate down to £6.25. Subsequently, along with the other measures, these should be constantly monitored by the assigned manager and the drop – as well as the increase – could happen between pay periods.

In conclusion, Support Services Group is recommended to commence capacity management and planning process for its Rapid Deployment Service portfolio. A company-in-growth simply cannot afford the waste of unmanaged capacity especially when an expansion is planned to be implemented. The worst case scenario of unmanaged capacity as the engineer of weakened profitability could result in a situation where money has been wasted on inefficient process and cash-flow is experiencing grave risk regarding the overall existence of the company. The benefits of capacity management are not only to prevent such an event from happening but to champion the company from the unstable growth period to well controlled expansion. Inevitably, the sooner the capacity process is implemented the better. Once the operation sees day light, a competent entity of a manager and/or a team is to be assigned to ensure the fluctuation and monitor the outcomes while improving the areas which experience inefficiency. The suggestions, information and methods provided by this thesis will function well as a platform for the start of capacity management for RDS.

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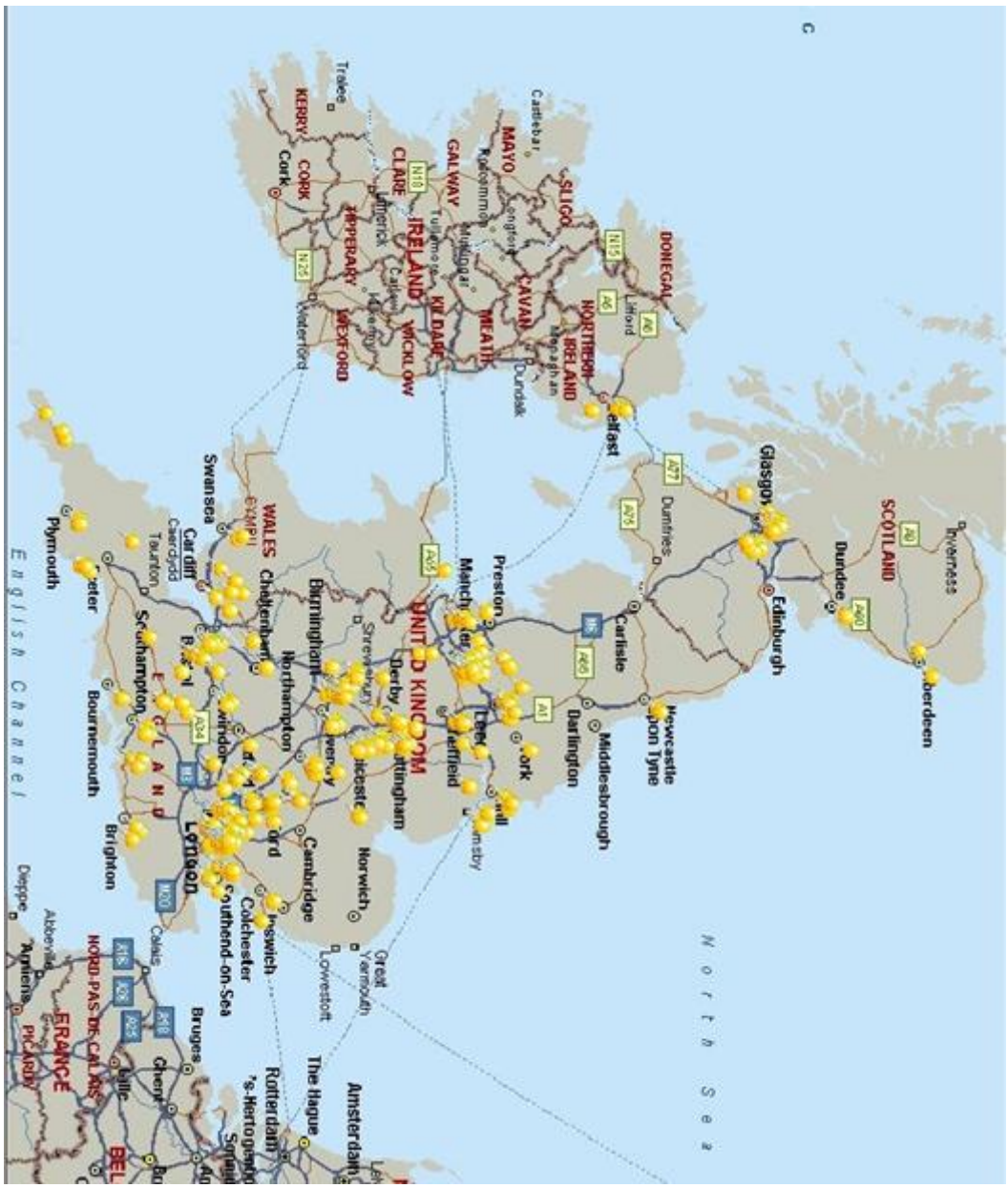
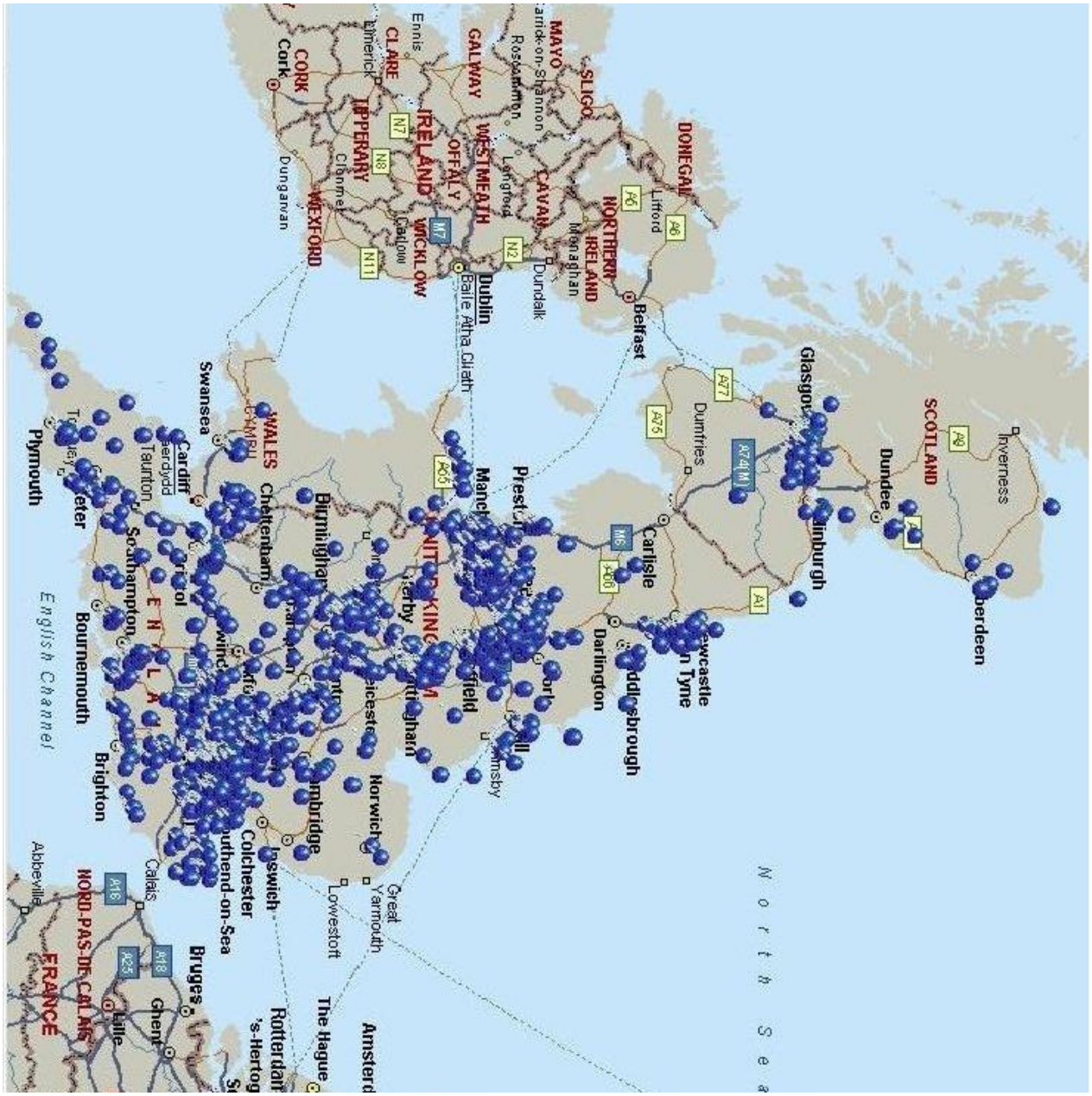
APPENDICES

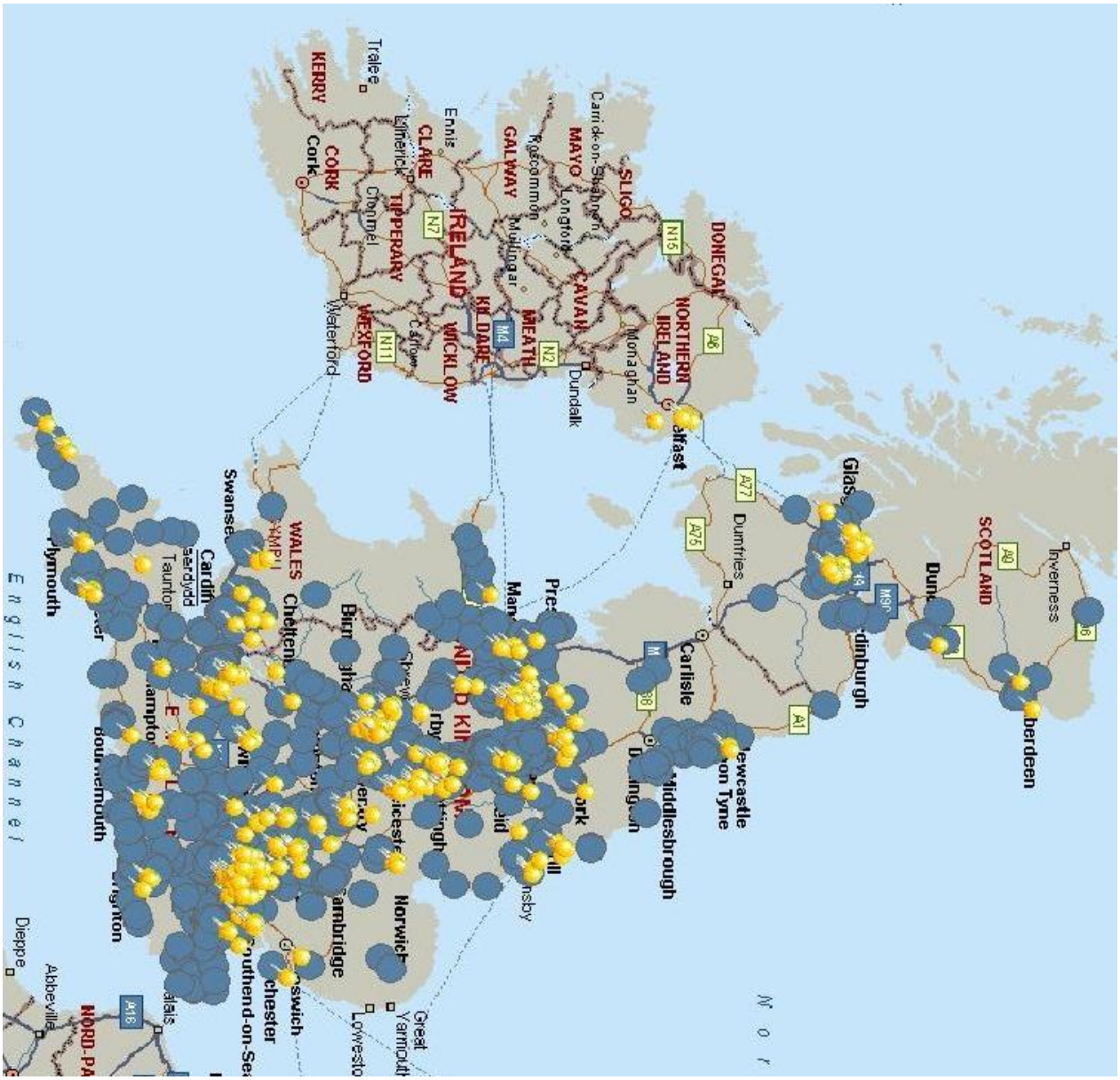
Appendix 1 RDS employee locations in UK



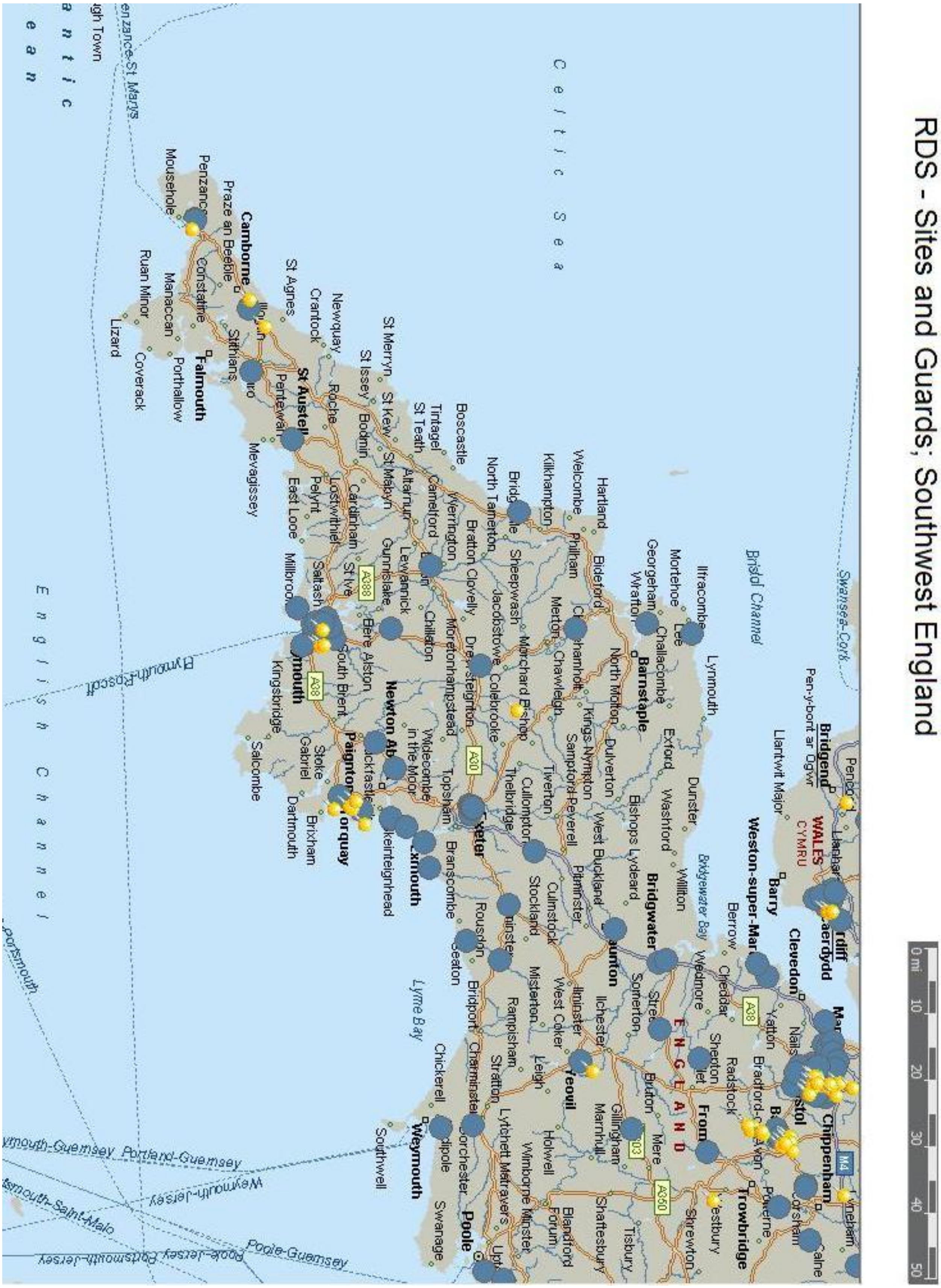
Appendix 2 RDS contracted and active sites 1.1.2009-13.8.2011



Appendix 3 RDS guards and site combined. Guards illustrated as yellow pins and sites as blue circles.



Appendix 4


RDS - Sites and Guards; Southwest England
Celtic Sea
Bristol Channel
English Channel
Lyme Bay
WALES
CYMRU
ENGLAND
Penzance
Camborne
Falmouth
St Austell
Plymouth
Exeter
Barnstaple
Bridgwater
Taunton
Yeovil
Weymouth
Poole
Torquay
Paignton
Newton Abbot
Exmouth
Trowbridge
Chippenham
Clevedon
Weston-super-Mare
Barry
Bridgend
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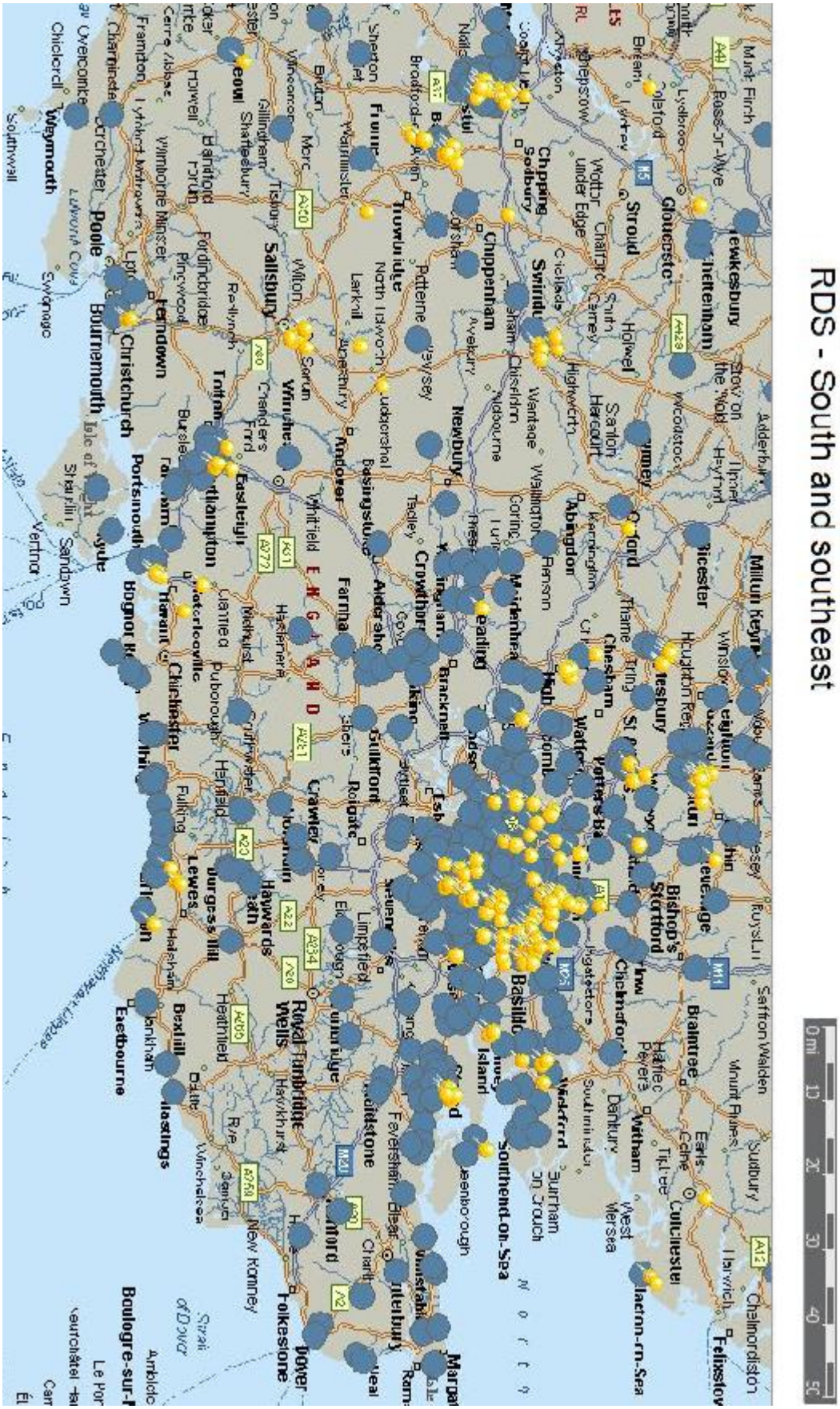
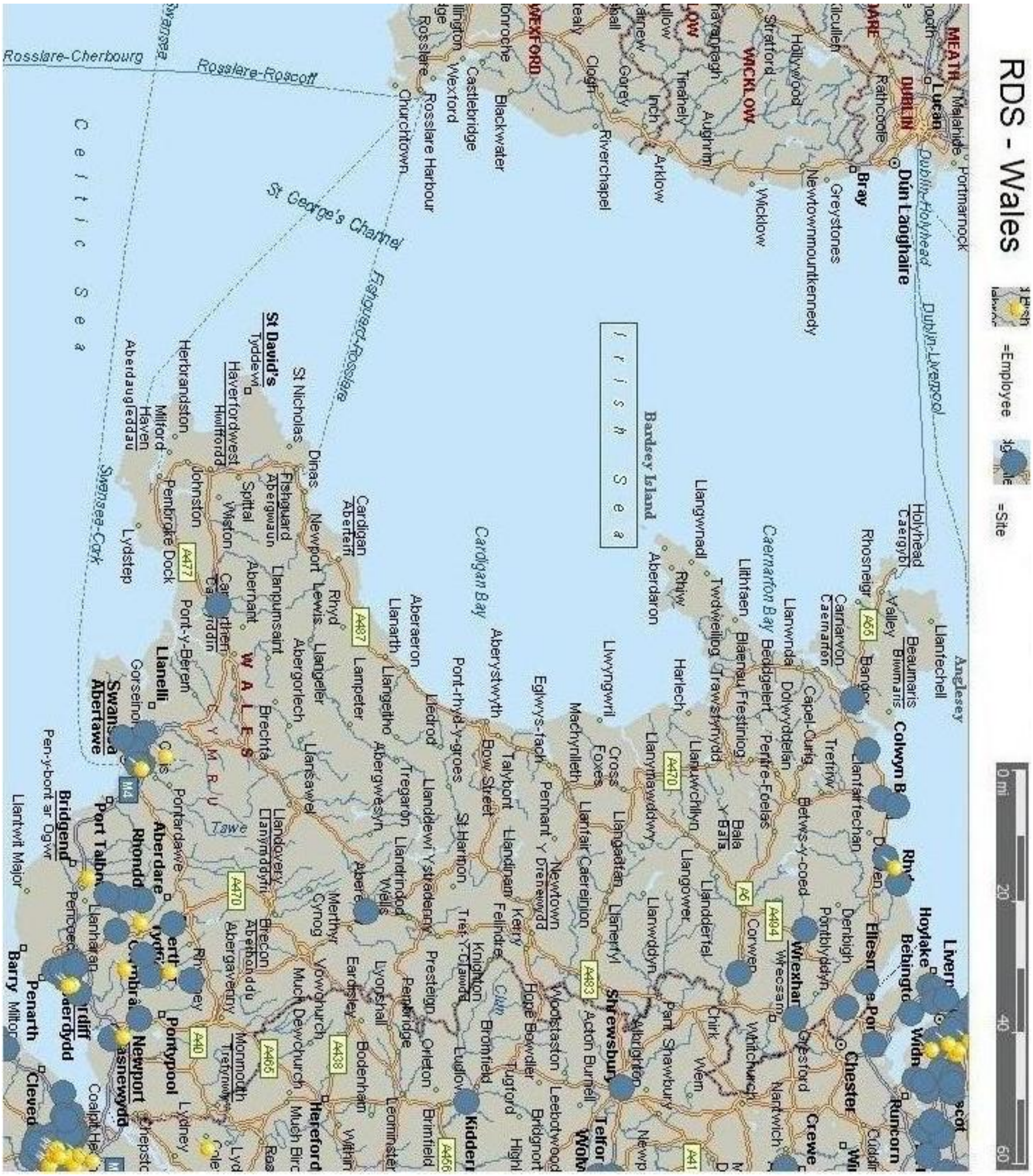
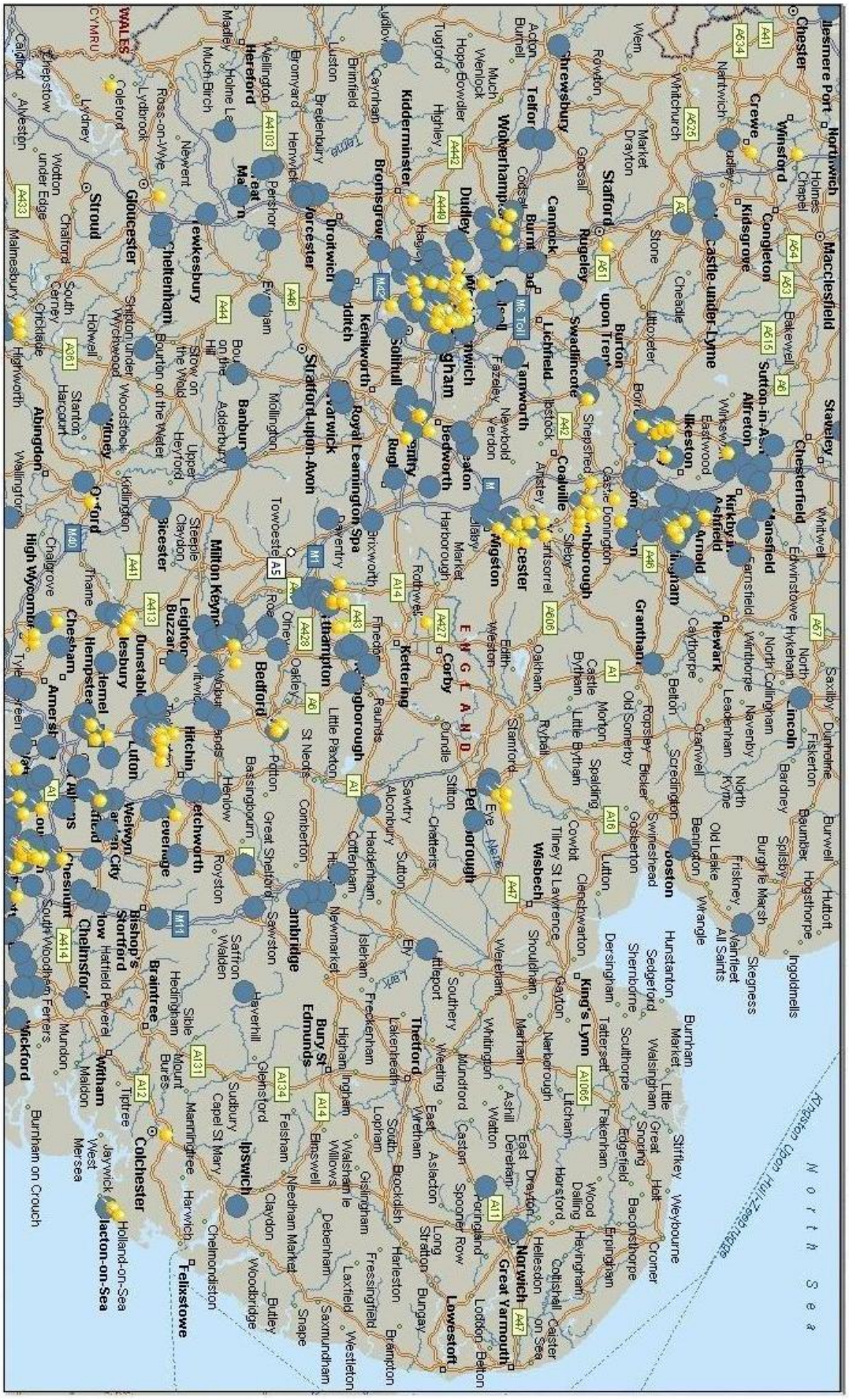
Appendix 5



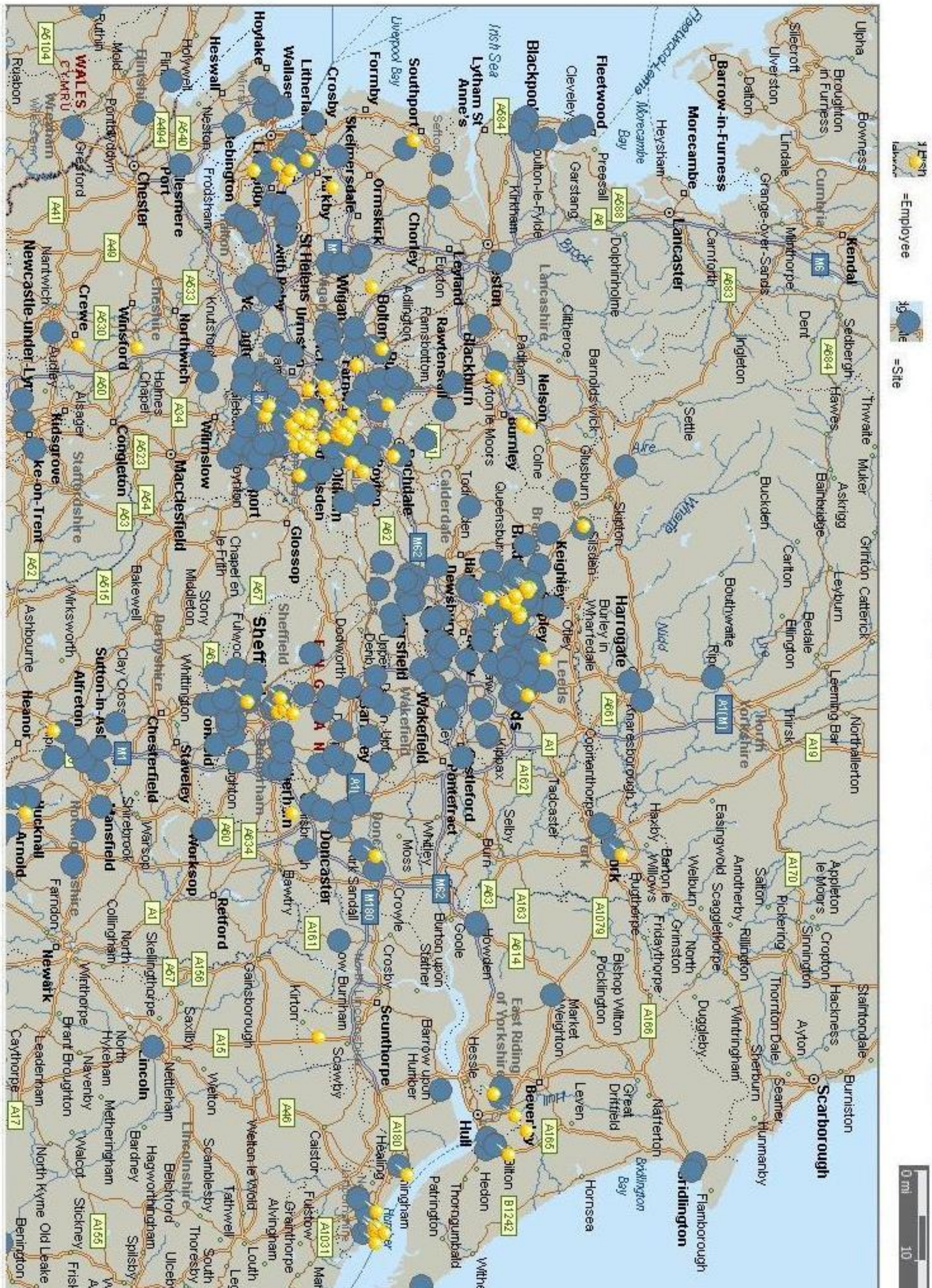
Appendix 6



Appendix 7



Appendix 8


RDS - Central North England; Liverpool, Manchester, Sheffield, Leeds
=Employee
=Site
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10
20
30

Appendix 9


RDS - North Ireland & Glasgow
=Employee
=Site
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20
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60
Atlantic Ocean
Irish Sea
SCOTLAND
ENGLAND
ISLE OF MAN
Isle of Man
Douglas
Belfast
Londonderry
Coleraine
Portadown
Lurgan
Lisburn
Newtownabbey
Antrim
Carrickfergus
Newtownards
Bangor
Ballymena
Larne
Omagh
Enniskillen
Dungannon
Armagh
Newry
Dundalk
Ballymoney
Ballycastle
Portstewart
Portrush
Ballycastle
Rathlin Island
Rathlin Sound
North Channel
Fifth of Lorn
Firth of Clyde
Solway Firth
Luce Bay
Irvine
Kilmarnock
Ayr
Dumfries
Stranraer
Girvan
Prestwick
Glasgow
Falkirk
Stirling
Edinburgh
Dunfermline
Musselburgh
Carlisle
Workington
Whitehaven
Penrith
Kendal
Lancaster
Morecambe
Rochester
Newtown St Boswells
Hawick
Jedburgh
Kelso
Coldstream
Berwick-upon-Tweed
Alnwick
Belfast to Stranraer
Belfast to Douglas
Liverpool to Douglas
Heysham to Douglas
Fishguard to Rosslare
Holyhead to Dublin
Dublin to Liverpool
Dublin to Belfast
Dublin to Cork
Dublin to Rosslare
Rosslare to Cherbourg
Rosslare to Pembroke
Pembroke to Rosslare
Pembroke to Dublin
Swansea to Cork
Cork to Swansea
Cork to Roscoff
Roscoff to Cork
Roscoff to Plymouth
Plymouth to Roscoff
Plymouth to Santander
Santander to Plymouth
Portsmouth to Santander
Santander to Portsmouth
Portsmouth to Cherbourg
Cherbourg to Portsmouth
Portsmouth to Caen
Caen to Portsmouth
Portsmouth to Le Havre
Le Havre to Portsmouth
Portsmouth to St Malo
St Malo to Portsmouth
Poole to Cherbourg
Cherbourg to Poole
Poole to Guernsey
Guernsey to Poole
Poole to Jersey
Jersey to Poole
Weymouth to Guernsey
Guernsey to Weymouth
Weymouth to Jersey
Jersey to Weymouth
Weymouth to St Malo
St Malo to Weymouth
Weymouth to Cherbourg
Cherbourg to Weymouth
Portland to Cherbourg
Cherbourg to Portland
Portland to St Malo
St Malo to Portland
Portland to Caen
Caen to Portland
Portland to Le Havre
Le Havre to Portland
Newhaven to Dieppe
Dieppe to Newhaven
Newhaven to Le Havre
Le Havre to Newhaven
Dover to Calais
Calais to Dover
Dover to Dunkerque
Dunkerque to Dover
Ramsgate to Ostend
Ostend to Ramsgate
Ramsgate to Dunkerque
Dunkerque to Ramsgate
Harwich to Hook of Holland
Hook of Holland to Harwich
Harwich to Zeebrugge
Zeebrugge to Harwich
Harwich to Esbjerg
Esbjerg to Harwich
Harwich to Cuxhaven
Cuxhaven to Harwich
Harwich to Gothenburg
Gothenburg to Harwich
Harwich to Amsterdam
Amsterdam to Harwich
Hull to Rotterdam
Rotterdam to Hull
Hull to Zeebrugge
Zeebrugge to Hull
Hull to Gothenburg
Gothenburg to Hull
Hull to Amsterdam
Amsterdam to Hull
Immingham to Rotterdam
Rotterdam to Immingham
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Immingham to Esbjerg
Esbjerg to Immingham
Immingham to Cuxhaven
Cuxhaven to Immingham
Immingham to Hamburg
Hamburg to Immingham
Immingham to Bremerhaven
Bremerhaven to Immingham
Immingham to Antwerp
Antwerp to Immingham
Immingham to Rosyth
Rosyth to Immingham
Immingham to Leith
Leith to Immingham
Immingham to Aberdeen
Aberdeen to Immingham
Immingham to Lerwick
Lerwick to Immingham
Immingham to Kirkwall
Kirkwall to Immingham
Immingham to Stromness
Stromness to Immingham
Immingham to Scrabster
Scrabster to Immingham
Immingham to Stornoway
Stornoway to Immingham
Immingham to Ullapool
Ullapool to Immingham
Immingham to Oban
Oban to Immingham
Immingham to Fort William
Fort William to Immingham
Immingham to Inverness
Inverness to Immingham
Immingham to Invergordon
Invergordon to Immingham
Immingham to Aberdeen
Aberdeen to Immingham
Immingham to Lerwick
Lerwick to Immingham
Immingham to Kirkwall
Kirkwall to Immingham
Immingham to Stromness
Stromness to Immingham
Immingham to Scrabster
Scrabster to Immingham
Immingham to Stornoway
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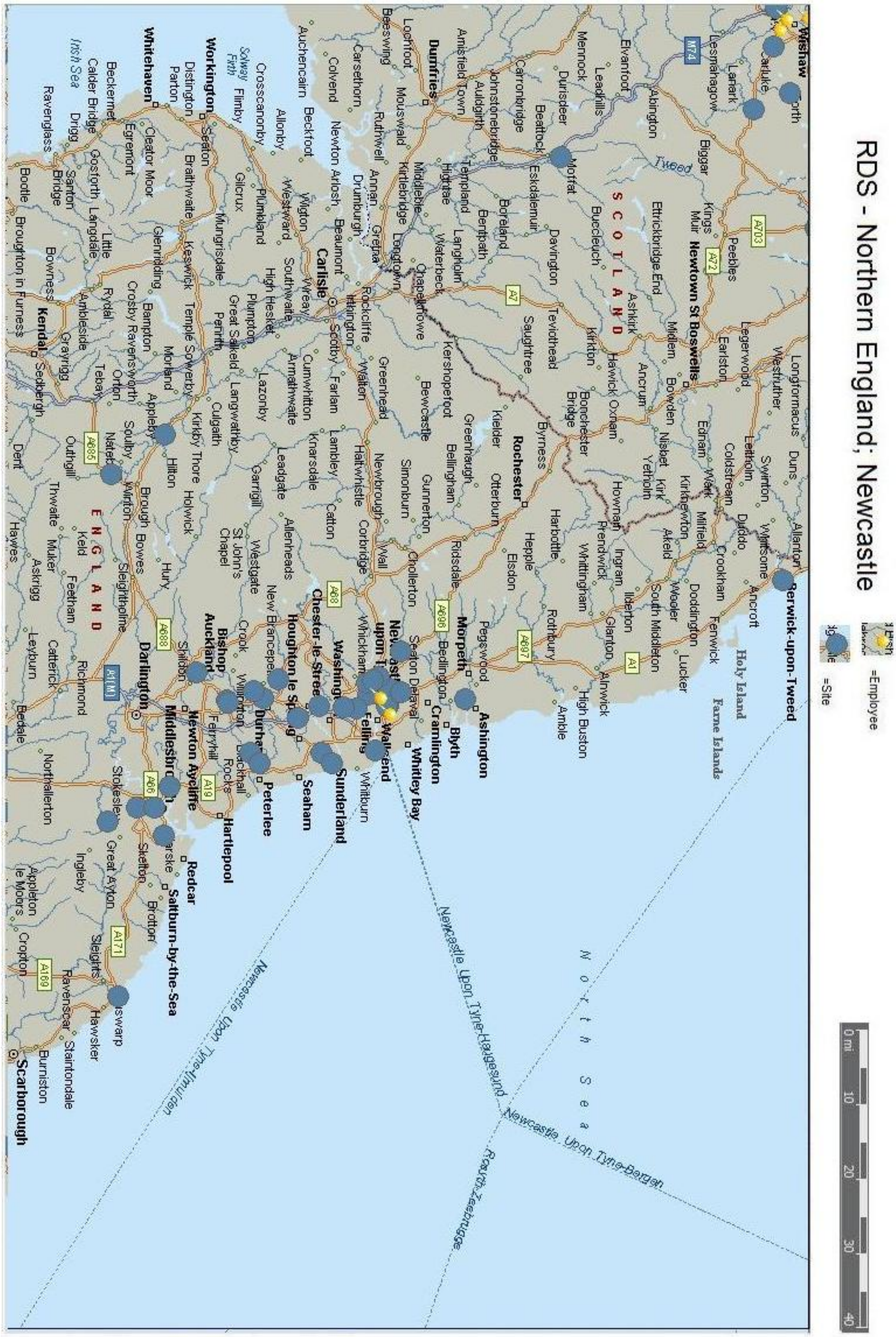
Invergordon to Immingham

Appendix 10


RDS - Northern England; Newcastle
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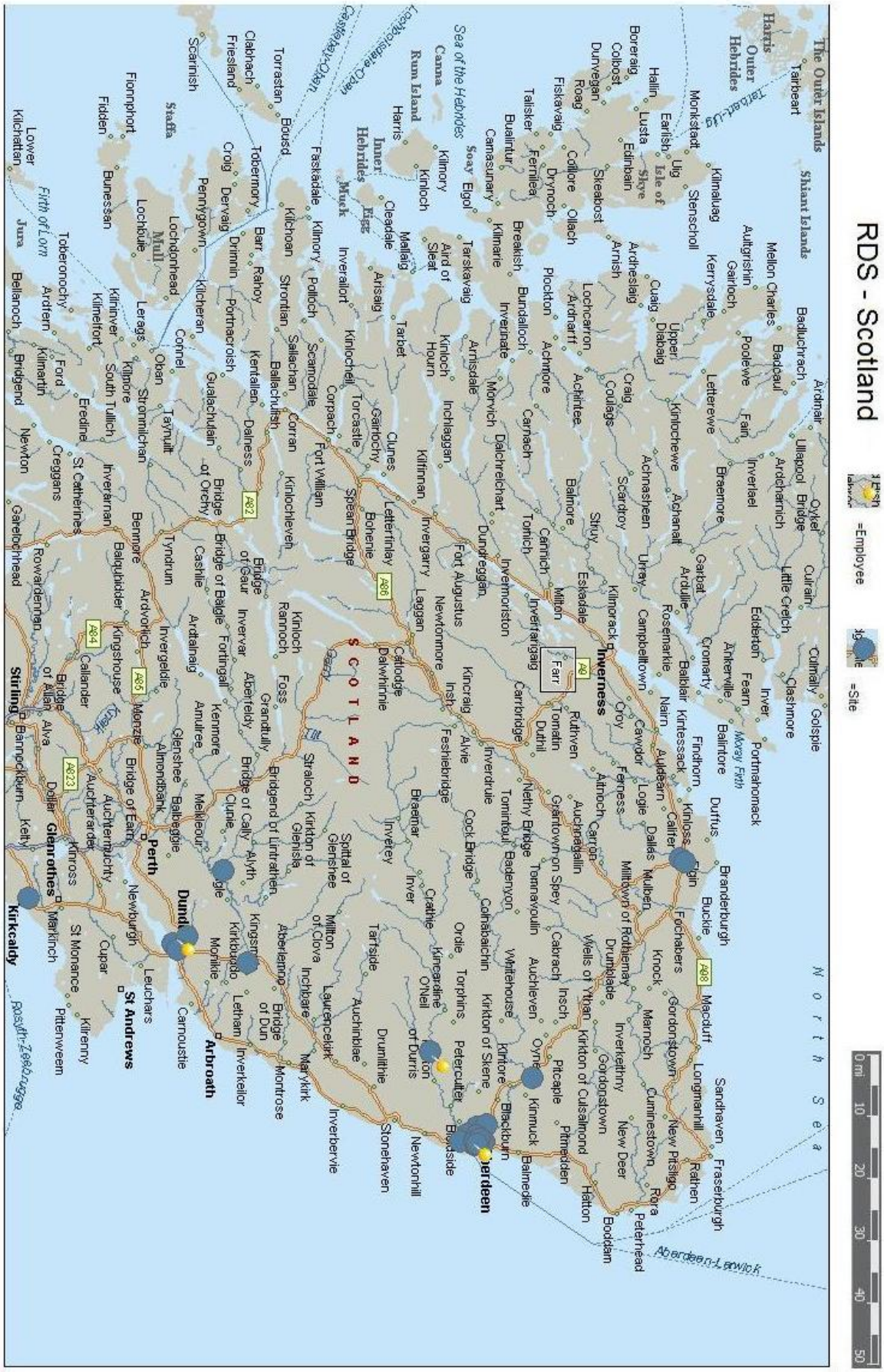
Appendix 11


RDS - Scotland
=Employee
=Site
N o r t h S e a
0 mi 10 20 30 40 50
Inverness
Aberdeen
Dundee
Perth
Stirling
Kirkcaldy
Arbroath
St Andrews
Fort William
Oban
Mull
Skye
Isle of Lewis
Harris
Outer Hebrides
Inner Hebrides
Sea of the Hebrides
The Outer Islands
Shiant Islands
Caledonian Canal
Moray Firth
Firth of Forth
Firth of Tay
Firth of Lorn
Aberdeen-Lerwick
Inverness-Perth
Perth-Edinburgh
Edinburgh-Glasgow
Glasgow-Oban
Glasgow-Stranraer
Stranraer-Belfast
Belfast-Dublin
Dublin-Rosslare
Rosslare-Fishguard
Fishguard-Cardiff
Cardiff-Swansea
Swansea-Plymouth
Plymouth-Exeter
Exeter-Bristol
Bristol-Cardiff
Cardiff-Newport
Newport-Gloucester
Gloucester-Cheltenham
Cheltenham-Oxford
Oxford-Reading
Reading-London
London-Ipswich
Ipswich-Norwich
Norwich-Cambridge
Cambridge-Peterborough
Peterborough-Lincoln
Lincoln-Doncaster
Doncaster-Leeds
Leeds-York
York-Darlington
Darlington-Newcastle
Newcastle-Edinburgh
Edinburgh-Aberdeen
Aberdeen-Inverness
Inverness-Thurso
Thurso-Wick
Wick-Kirkwall
Kirkwall-Stromness
Stromness-Lerwick
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A836
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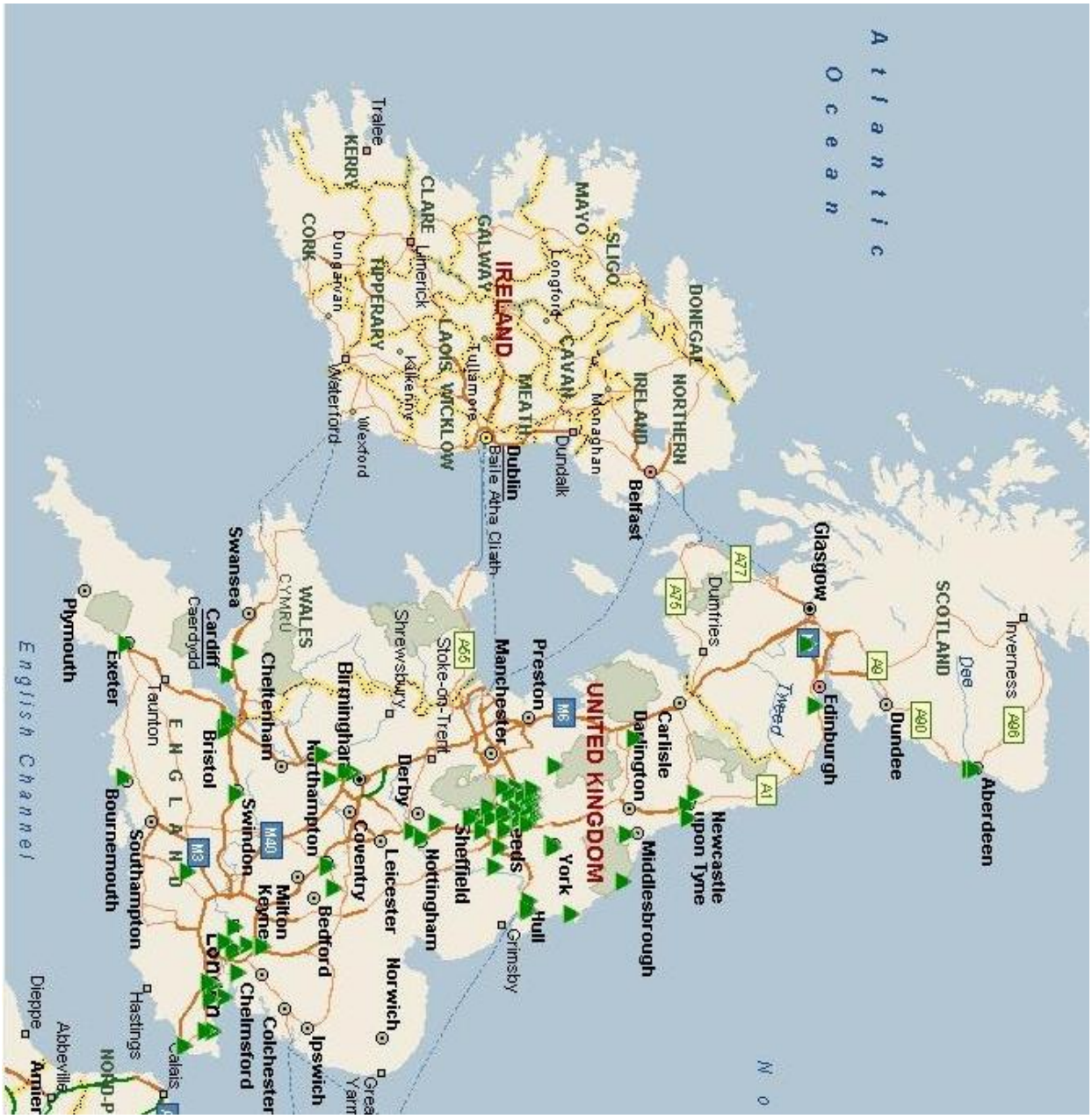
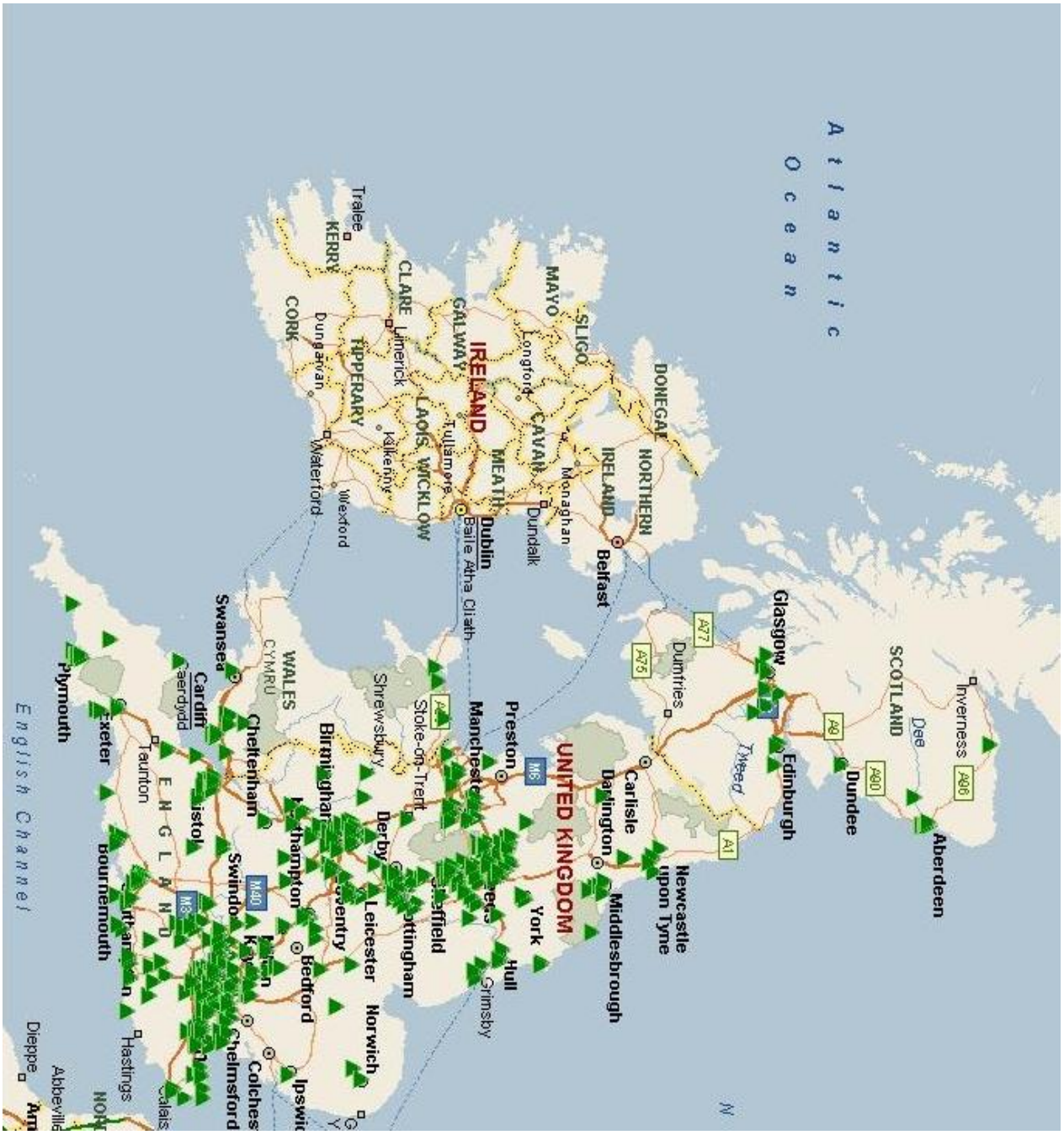
Appendix 12 Demand by the end of April ’09

Appendix 13 Demand by the end of August ’09

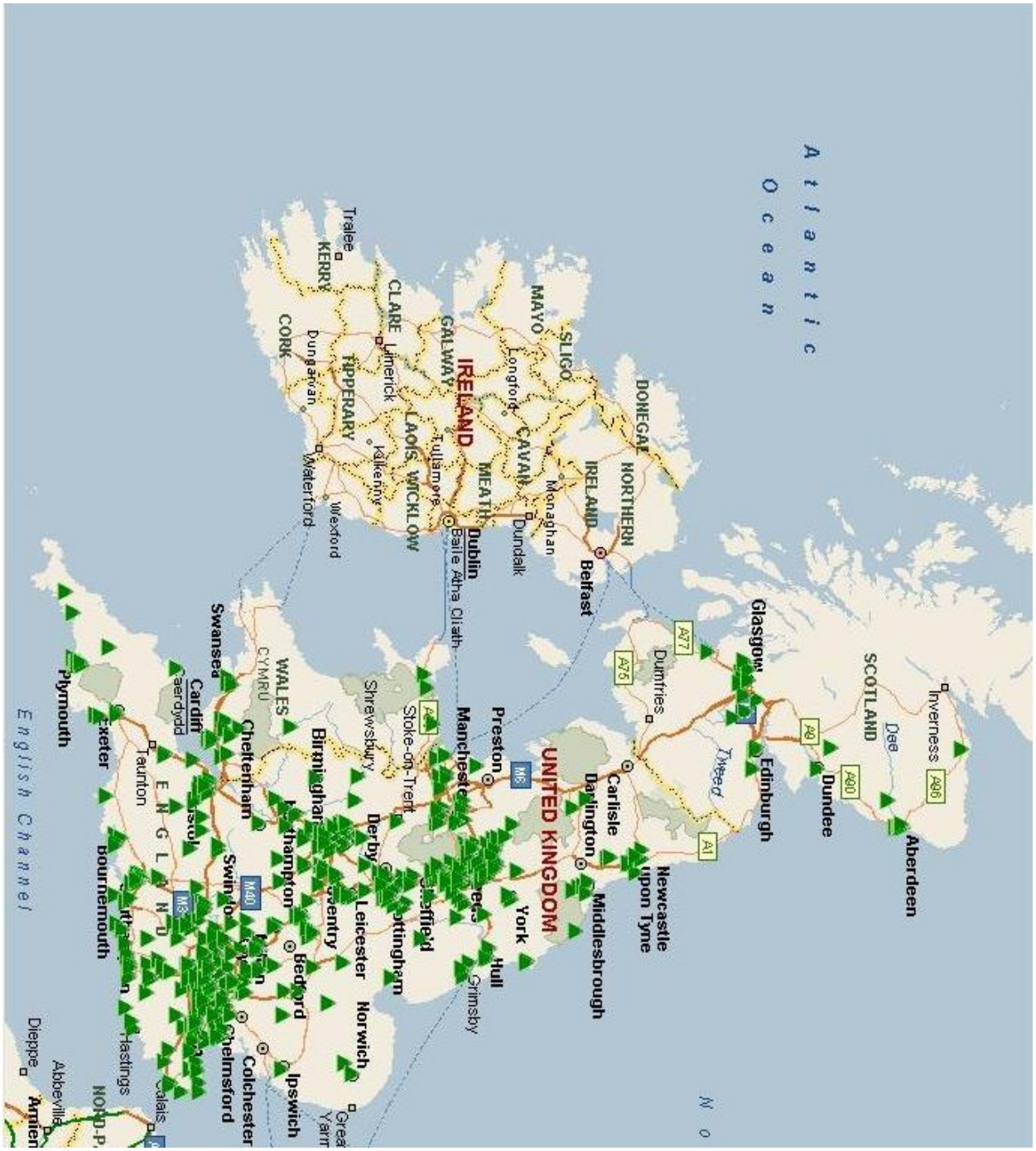


Appendix 14 Demand by the end of December ’09

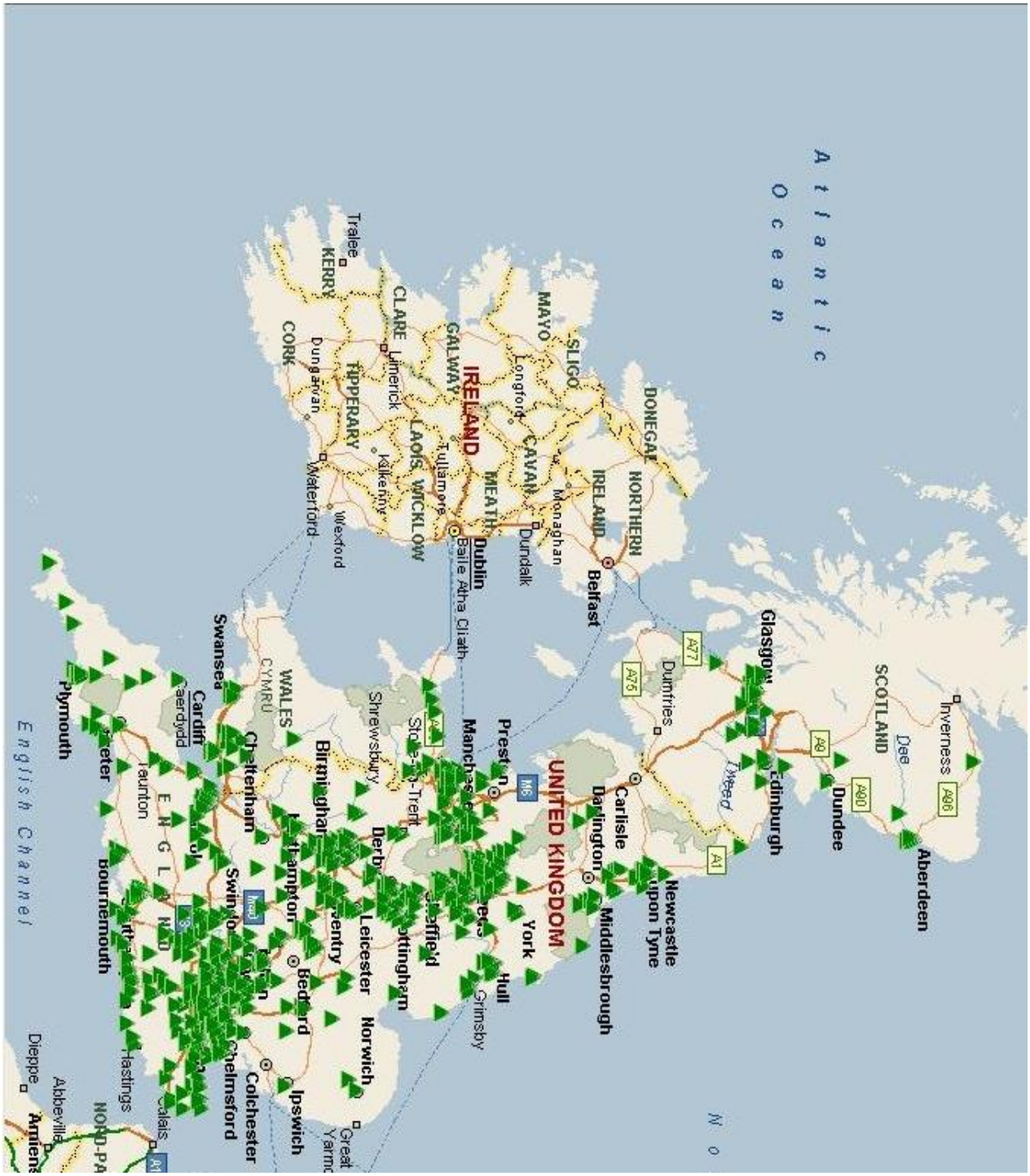
Appendix 15 Demand by the end of April ’10



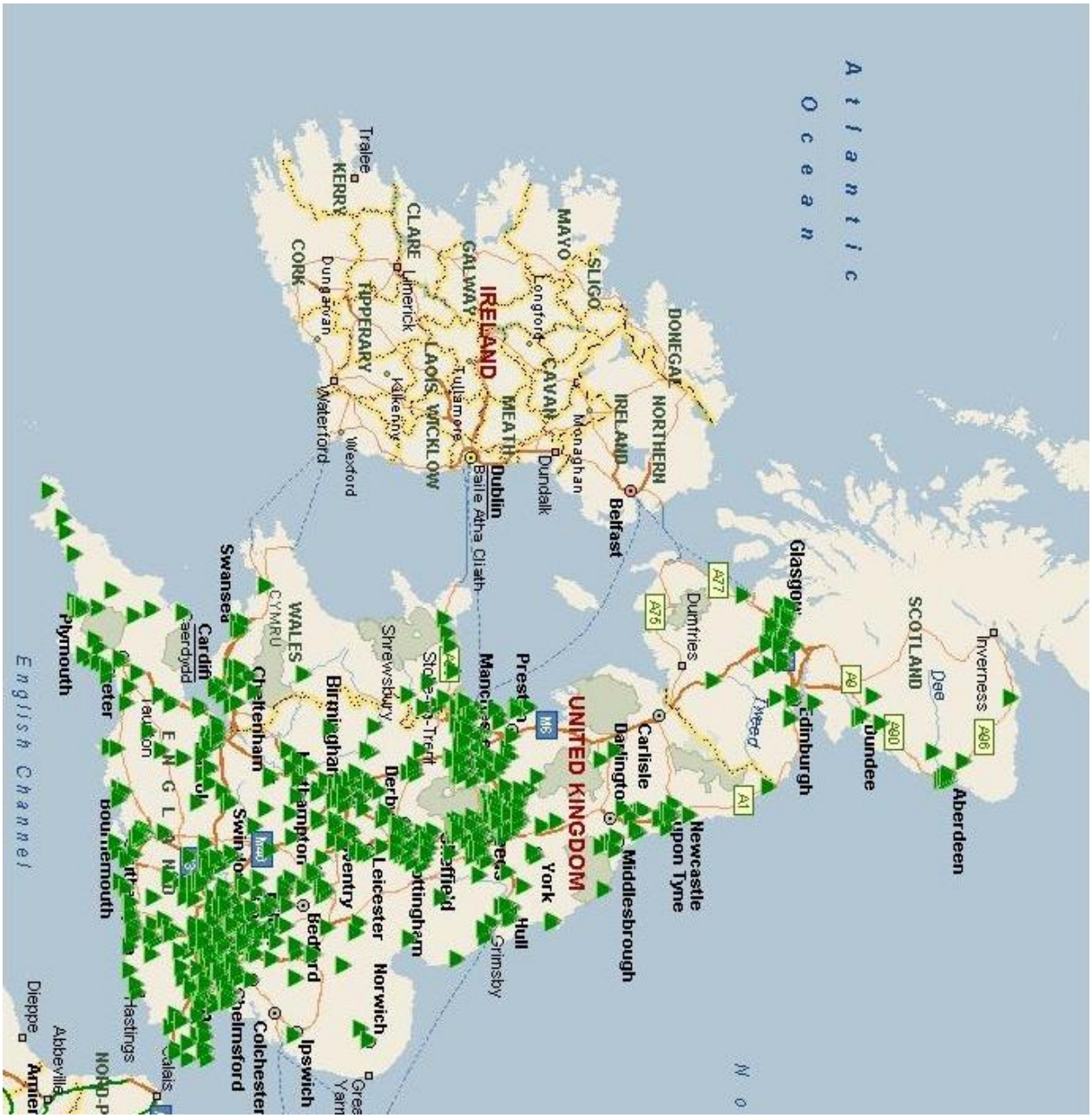
Appendix 16 Demand by the end of August ’10



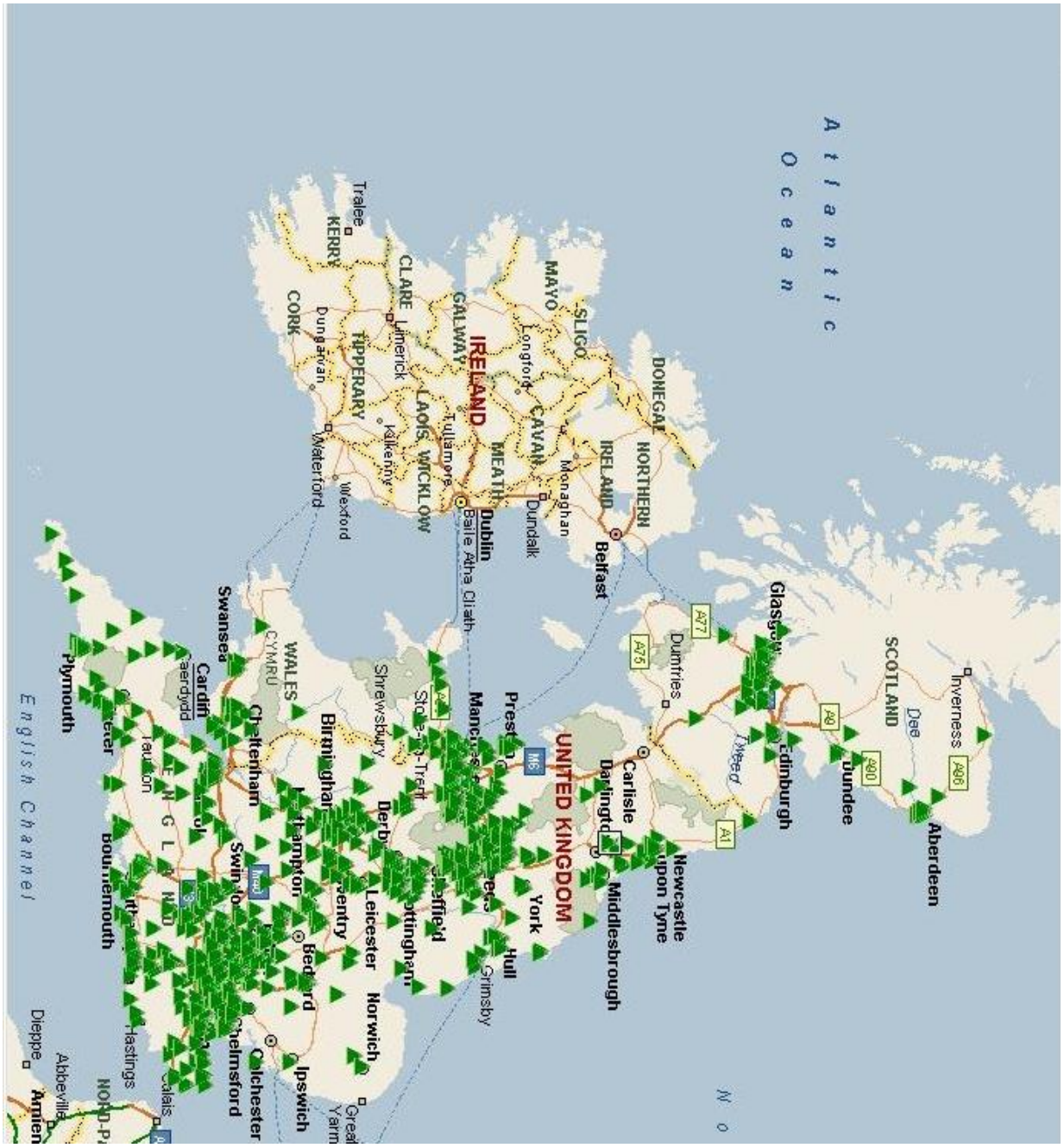
Appendix 17 Demand by the end of December ’10



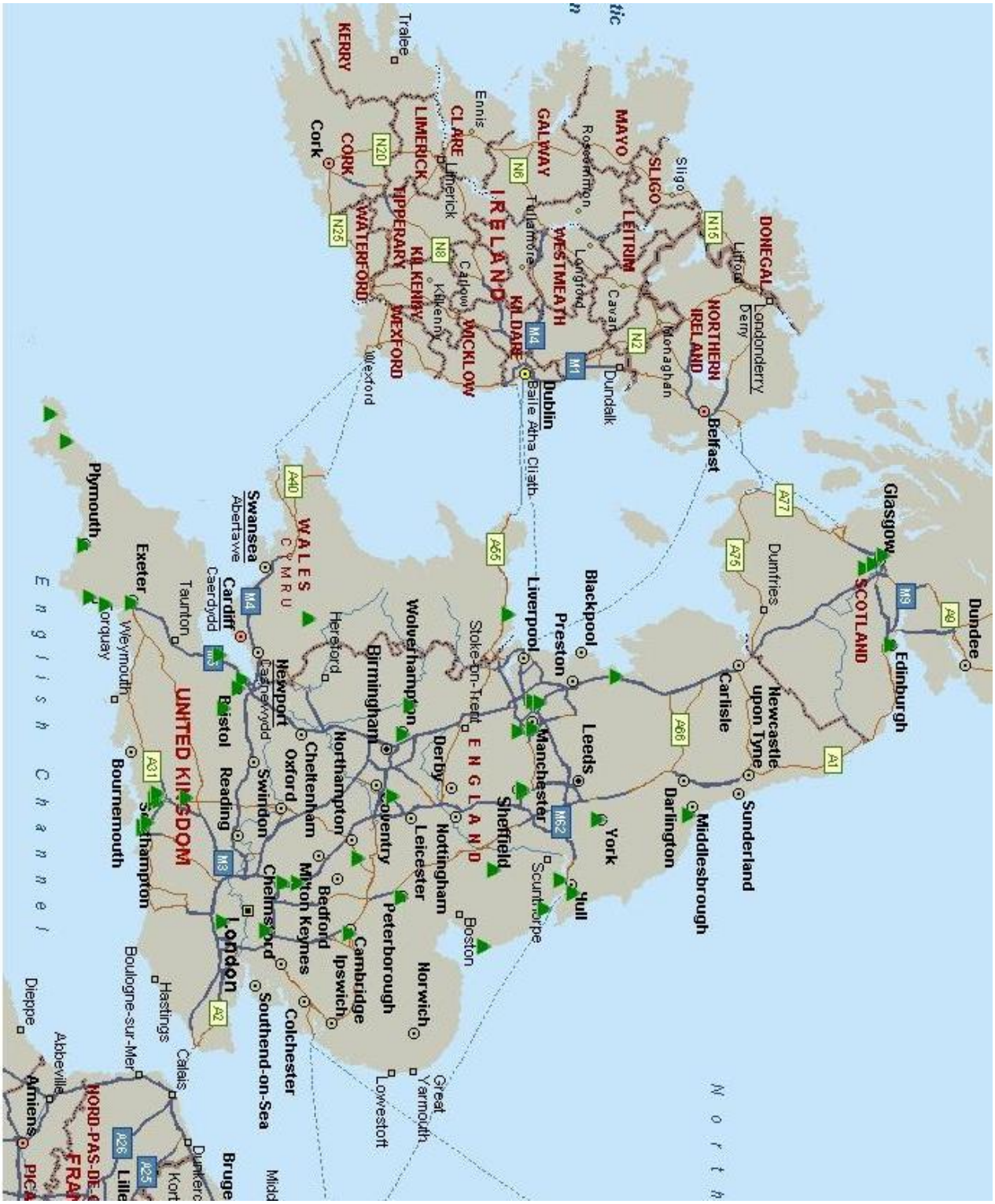
Appendix 18 Demand by the end of April ’11



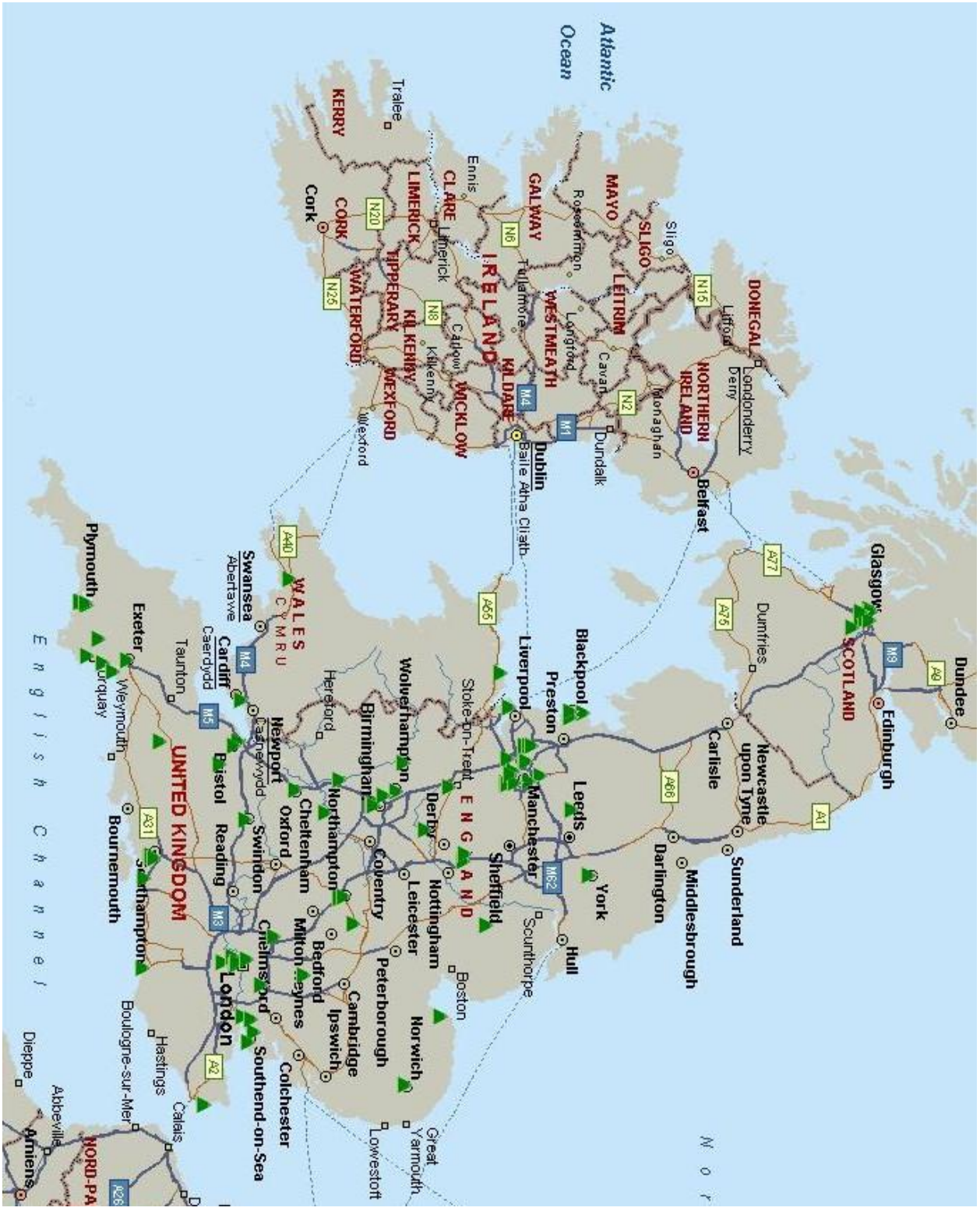
Appendix 19 Demand by the end of August ’11



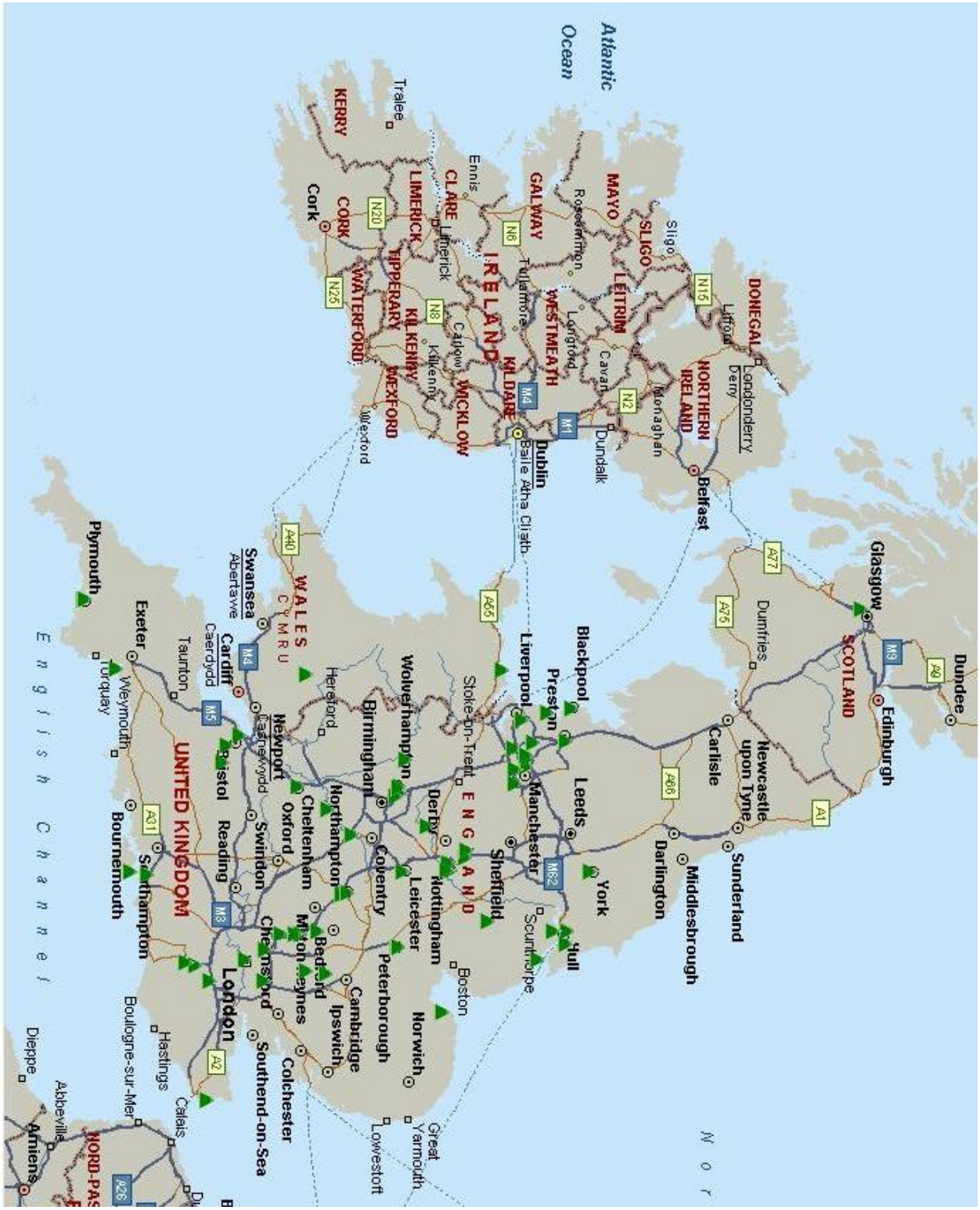
Appendix 20 Subcontractor usage RDS January 2011



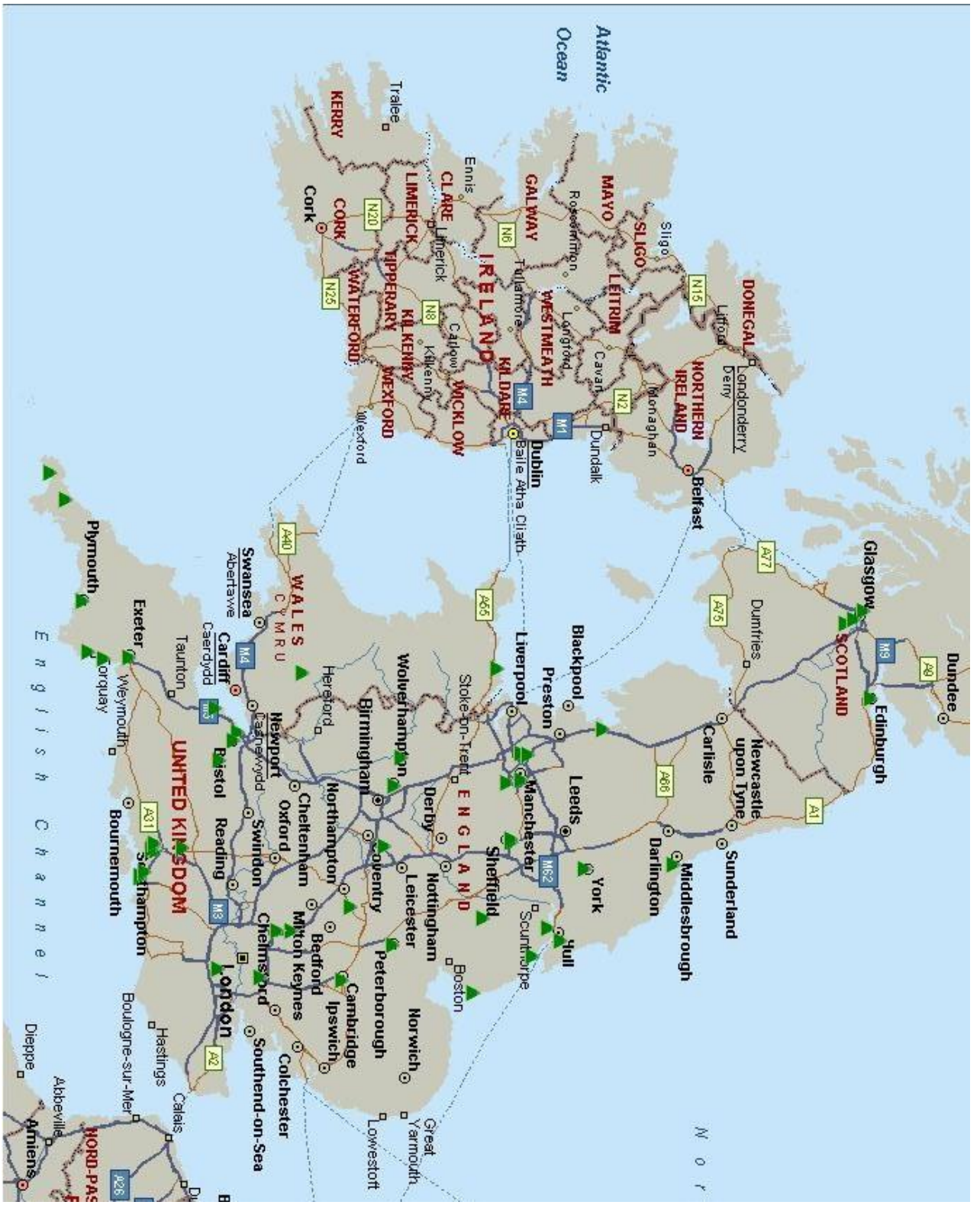
Appendix 21 Subcontractor usage RDS February 2011



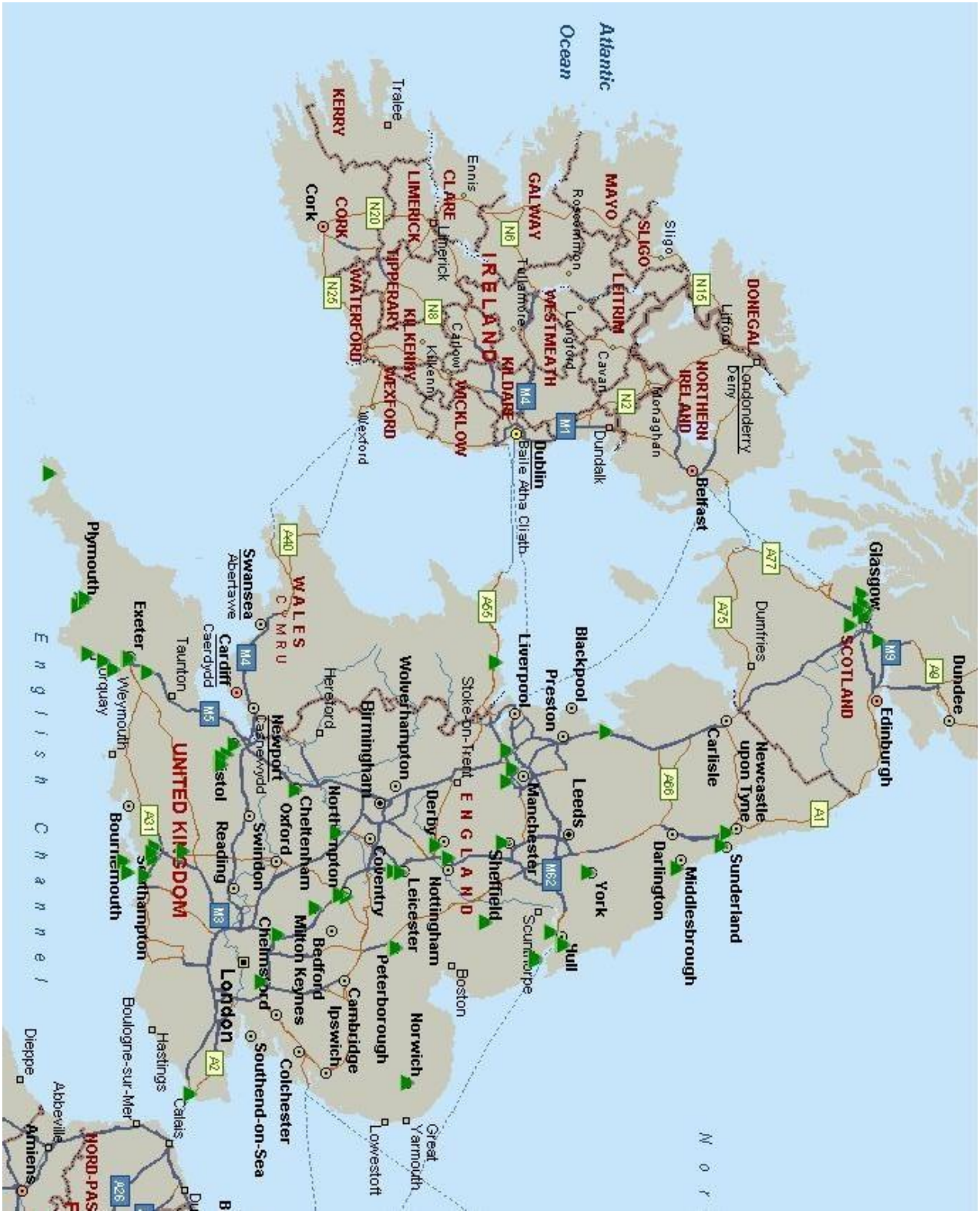
Appendix 22 Subcontractor usage RDS March 2011



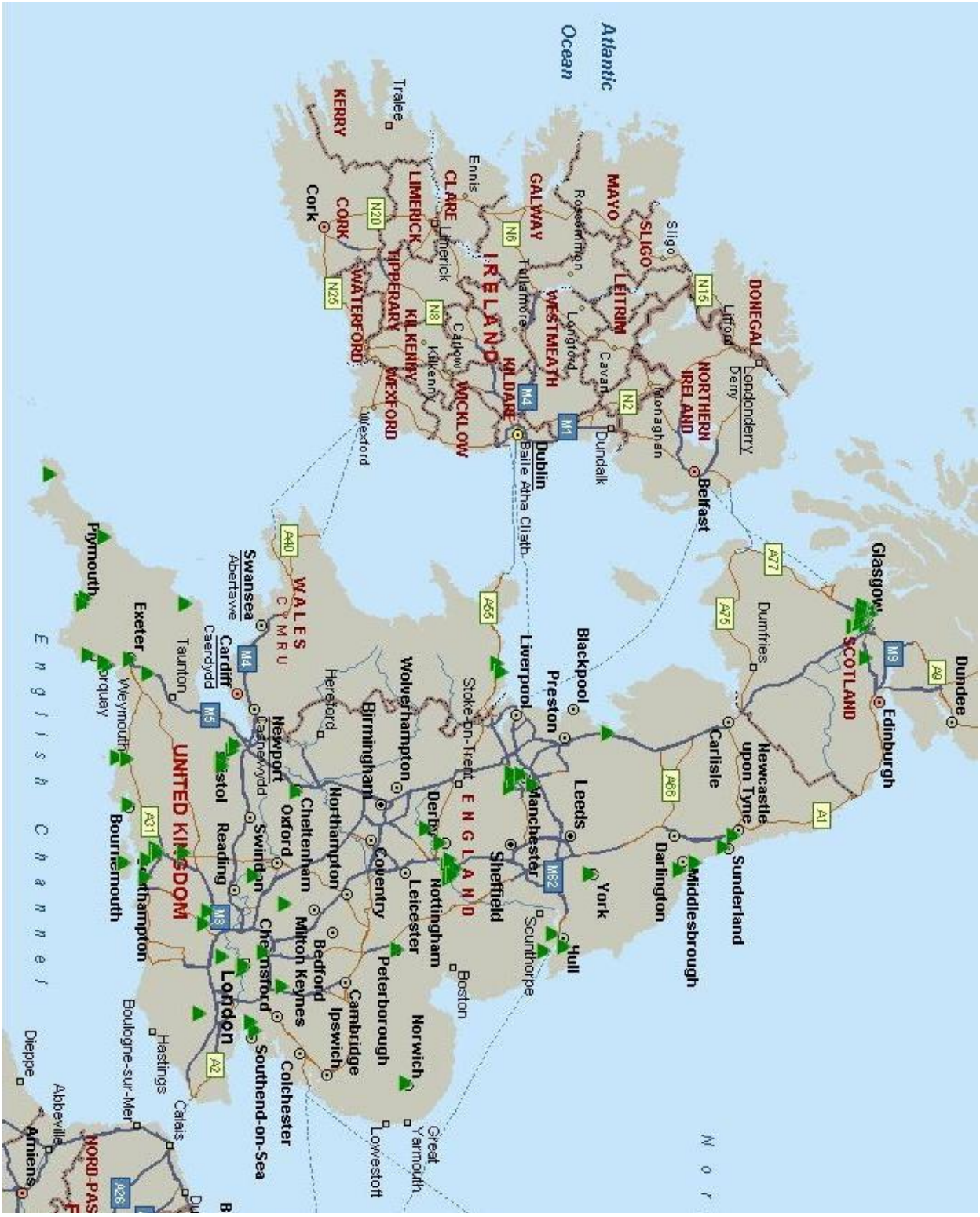
Appendix 23 Subcontractor usage RDS April 2011



Appendix 24 Subcontractor usage RDS May 2011



Appendix 25 Subcontractor usage RDS June 2011



Appendix 26 Subcontractor usage RDS July 2011