

Network Rail Infrastructure Access Points




Benefit Analysis

Network Rail Ltd

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Executive Summary

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Executive Summary

The objective of the benefit analysis report was to justify the perceived benefits for the upgrade of road rail access points. This was completed by firstly analysing the current condition of access points. This task was undertaken by a Network Rail workshop and from this came the requirement for the best practise design guide which provided a categorisation of access points and example layout drawings. Benchmarking was difficult due to the data available but a comparison was made with INECO from the spanish railway network which highlighted different functions and processes being used on access points.

Case study examples were given of safety incidents that have influenced the escalation for the requirement to upgrade access points. This was then further analysed using data from the SMIS database on incidents and accidents at access points. The high level of incidents and accidents from the data supports the justification for the upgrade of the access points. Then using the access point categorisation and layout drawings from the best practise design guide unit rates were sourced from the LNW works delivery team along with input from external companies and an example capital cost for the different access points was completed. The benefit analysis was concluded using a benefits model and benefits brainstorm, from this a benefits realisation matrix was created for each of the benefits for analysis using high to low priority. A benefit matrix was then utilised for each of the elements in the access point categorisation against the sub categories for consideration. This provided a review on the criticality of each element as a benefit. The analysis concludes that safety, sustainability and efficiency are the main benefits from the upgrade of access points.

It is recommended that the operational costs are completed and a higher level review of the access points is required for each route to provide a more accurate cost for the access point upgrade.

The benefit annalysis completed was limited as the costs are tangible but the majority of benefits are intangible, the tangible benfits will be seen in the reduction in train delays, safety incidents and possessions required to complete on track works.

1. Introduction

1.1 Appointment

- 1.1.1 Capita Property and Infrastructure Ltd (“Capita”) was commissioned by Network Rail (Ltd) (NR) to undertake a benefit analysis report to demonstrate the benefits associated with the evaluation and upgrade of road rail access points.

1.2 Proposed Development

- 1.2.1 The proposed range of upgrades at the road rail access points include, but is not limited to:

Steps	Concrete hardstanding
Handrails/guardrails	Kerbing/edging
Footways	Drainage/gullies/soakaways
Access roads	Fencing and gates
Permanents/temporary Lighting	Roadway
Enhanced security	Service connections – electricity/water
Signage	Parking
Welfare facilities	HGV turning area
Material storage	Amenity block
Sheltered briefing area	Armco barrier – vehicle protection

- 1.2.2 The proposed infrastructure will have a life cycle of 25 years as stated in the best practise design guide.

1.3 Objectives

- 1.3.1 The purpose of the benefit analysis is to demonstrate and present the benefits associated with the evaluation and upgrade of road rail access points to the Network Rail Route RAMs.
- 1.3.2 To achieve the overall aim, the following objectives were broken down to three main sub sets of RRAV upgrade and assessment:
- Benchmarking against other transport infrastructure bodies.
 - Benefit analysis
 - Best practice design guide.

These 3 subsets had to be in association with Delivery Point Management Bow Tie (Appendix A) and cross refer to the following considerations:

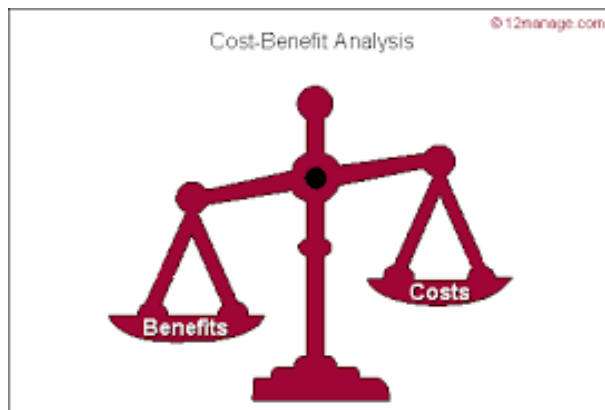
Sustainability	Competence
Whole Life Cycle Costing	Training
Safety	Briefing and Communication
Environmental	Supervision
Ecological	Planning
Cultural	Behavioural

1.4 Background

1.4.1 Benefit analysis is a systematic approach to estimating the strengths and weaknesses of alternatives that satisfy transactions, activities or functional requirements for a business. It is a technique that is used to determine options that provide the best approach for the adoption and practice in terms of benefits in labour, time and cost savings.

1.4.2 Benefit analysis has two purposes:

- 1.To determine if it is a sound investment/decision (justification/feasibility)
- 2.To provide a basis for comparing projects. It involves comparing the total expected cost of each option against the total expected benefits, to see whether the benefits outweigh the costs, and by how much.



1.4.3 There are two types of benefits:

1. Tangible benefits can be quantified with a high degree of certainty. For example - a reduction in train delays.
- 2.Intangible benefits are qualitative and not measureable. For example – improve customer service.

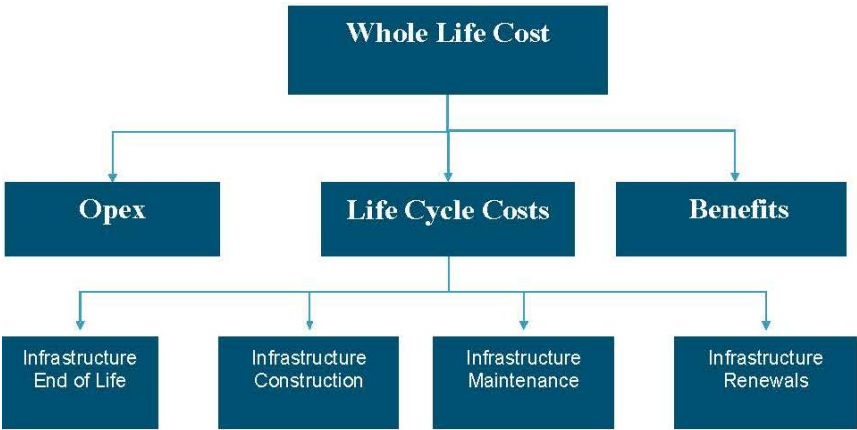
1.5 Definitions

1.5.1 Whole Life Cycle Costing

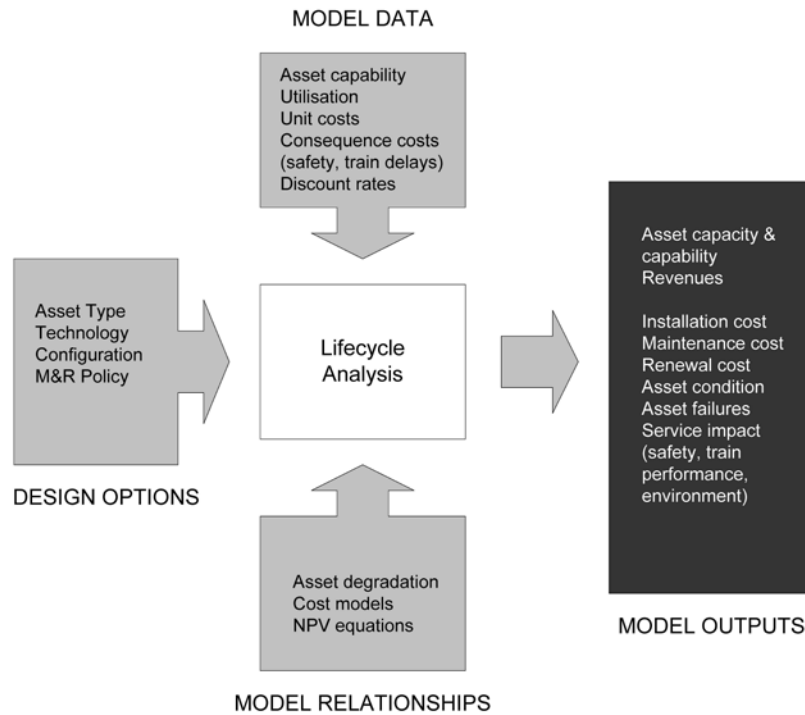
1.5.2 BS ISO Buildings and Constructed Assets – Service Life Planning – Part 5: Life Cycle Costing: 15686-5:2008, provides the following definitions:

Definitions	
Whole Life Costing (WLC)	This is a methodology for the systematic economic consideration of all whole life costs and benefits over a period of analysis, as defined in the agreed scope.
	An economic assessment considering all agreed projected significant and relevant cost flows over a period of analysis expressed in monetary value. The projected costs are those needed to achieve defined levels of performance, including reliability, safety and availability.

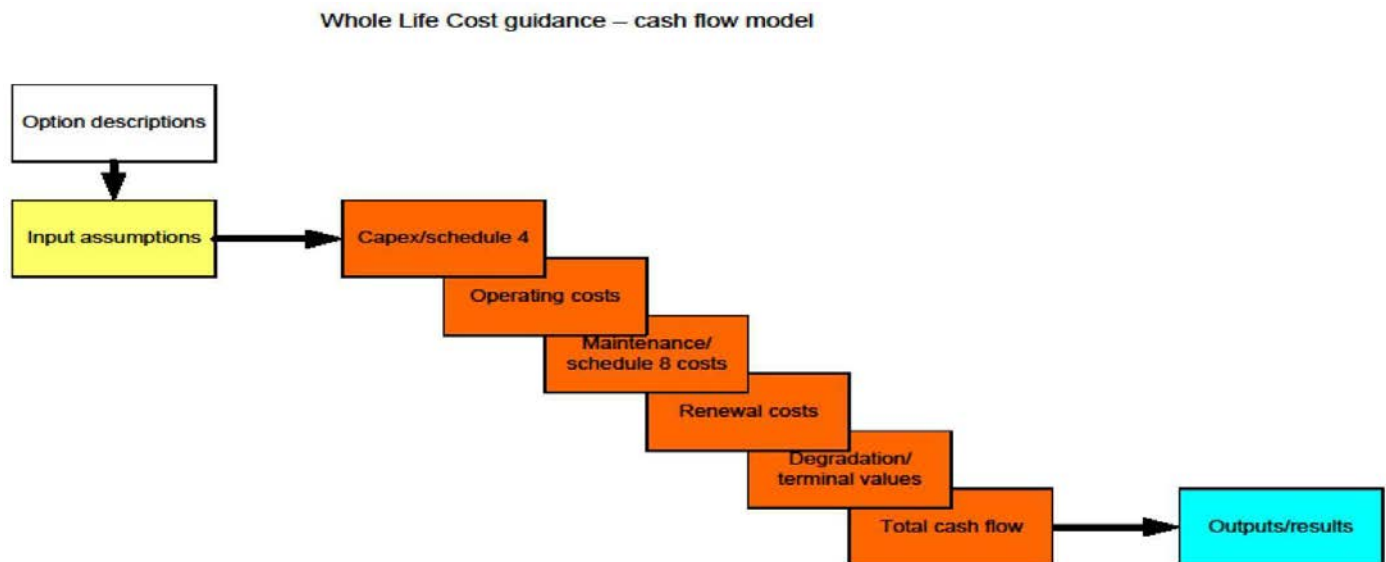
1.5.3 Whole Life Costing is presented in the diagram below.



1.5.4 The whole life costing model presented in figure 2 below shows the clear linkage between the inputs, process and outputs that are taken into account during whole life costing.

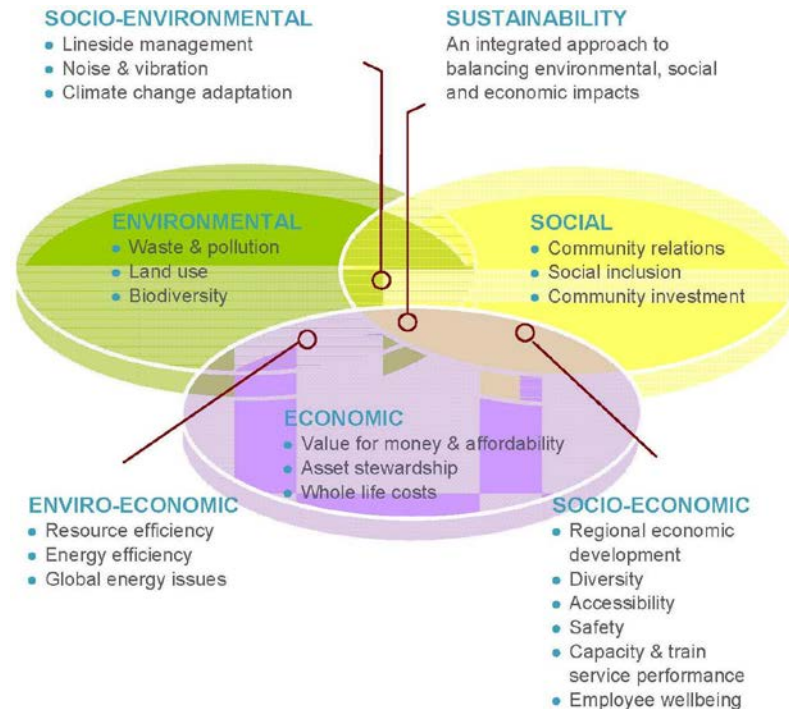


1.5.5 The cash flow model in figure 3 below shows the stages of costs which create the whole life cycle cost.



1.5.6 Sustainability

- 1.5.7 Achieving the quality of being sustainable, which is - Achieving or retaining an optimum compromise between performance, costs and risks over the lifecycle, whilst avoiding adverse long-term impacts to the organisation from short-term decisions. Taking into account social, environmental and economic factor as shown in the figure below:



1.5.8 Benchmarking

- 1.5.9 Is the process of comparing one's business processes and performance metrics to industry bests or best practices from other companies. Dimensions typically measured are quality, time and cost. In the process of best practice benchmarking, management identifies the best firms in their industry, or in another industry where similar processes exist, and compares the results and processes of those studied to one's own results and processes. In this way, they learn how well the targets perform and, more importantly, the business processes that explain why these firms are successful.

For this report we will be using the following two types of benchmarking:

Functional benchmarking - a company will focus its benchmarking on a single function to improve the operation of that particular function. Complex functions such as Human Resources, Finance and Accounting and Information and Communication Technology are unlikely to be directly comparable in cost and efficiency terms and may need to be disaggregated into processes to make valid comparison.

Process benchmarking - the initiating firm focuses its observation and investigation of business processes with a goal of identifying and observing the best practices from one or more benchmark firms. Activity analysis will be required where the objective is to benchmark cost and efficiency; increasingly applied to back-office processes where outsourcing may be a consideration.

1.5.10 Access Point

1.5.11 The complete facility from highway access / access road / compound & facilities and the RRAP itself, providing a complete solution for the delivery and on/off tracking of Road Rail Vehicles.

1.5.12 RRAP

1.5.13 Road Rail Access Point, defined as the physical element located on track for the on/off tracking of Road Rail Vehicles.

1.5.14 On Tracking

1.5.15 On tracking is the process of placing Road Rail vehicles on the line.

1.5.16 Off Tracking

1.5.17 Off tracking is the process of removing Road Rail vehicles from the line.

1.5.18 RRV

1.5.19 A vehicle that can travel on the ground under its own power and also travel on rail by virtue of a rail wheel system under its own power system. Such vehicles are not allowed to operate, work or travel on rail outside possessions.

1.5.20 **Safety** - the condition of being protected from or unlikely to cause danger, risk, or injury.

1.5.21 **Environmental** - relating to the natural world and the impact of human activity on its condition.

1.5.22 **Ecological** - relating to or concerned with the relation of living organisms to one another and to their physical surroundings.

- 1.5.23 **Cultural** - relating to the ideas, customs, and social behaviour of a society.
- 1.5.24 **Behavioural** - involving, relating to, or emphasizing behaviour.
- 1.5.25 **Competence** - the ability to do something successfully or efficiently.
- 1.5.26 **Training** - the action of teaching a person a particular skill or type of behaviour.
- 1.5.27 **Briefing and Communication** - the imparting or exchanging of information by speaking, writing, or using some other medium.
- 1.5.28 **Supervision** - the action of supervising someone or something.
- 1.5.29 **Planning** - the process of making plans for something.
- 1.5.30 **Capex** – Capital Expenditure.
- 1.5.31 **Opex** – Operational Expenditure.
- 1.5.32 **Totex** – Total Expenditure.

2. Rationale

2.1 Background

Access points on the infrastructure vary enormously depending upon line category, purpose and location (urban / suburban). The vast majority of Network Rail's access points have not been designed as such, rather they have evolved over a century and a half of predominantly manual maintenance. During this time, safety has not generally been considered and the interface between railway maintenance vehicles, plant delivery, trains and pedestrians has not been a priority.

With the emphasis changing towards mechanised maintenance using heavy RRV machines and specialist RRV's for transporting personnel and heavy materials directly from maintenance depots to worksites, a need has arisen to standardise on access points, starting with those capable of HGV's delivery of plant and materials. Newly designed access points must retain the capacity to enable traditional style maintenance and renewals techniques whilst providing provision for modern vehicles and techniques.

The current Network Rail Policy for access points can be reviewed in the following documents:

- **NR/PLANT/0200/module P301** – Road Rail Access Points
- **NR/PLANT/0200/module P507** – Infrastructure Plant Operations Manual: On Track Plant
- **NR/PLANT/0200/module P703** – Infrastructure Plant Operations Manual: Road Rail Access Point Maintenance
- **COP0007** – Code of Practice for On & Off Tracking of Road Rail Vehicles
- **NR/L3/INI/CP0036** – The Provision of Welfare Facilities
- **NR/SP/OHS/069** – Lineside Facilities for Personnel Safety
- **NR/PLANT/0200** – Infrastructure Plant Manual
- **NR/L2/TRK/2102** – Design & Construction of Track
- **NR/L2/TRK/2049** – Track Design Handbook
- **NR/L3/CIV/003** - Engineering Assurance of Building & Civil Engineering Works

2.1.1 Safety Incidents – There has been numerous safety incidents that have influenced the changes required to the access points and have escalated the progression of these changes due to the serious nature of these incidents, the delays which coincided with them causing regulators involvement and review. The incidents are as follows:

- 2.1.2 Shalford bridge strike – In September 2014 a RRV travelling to site to complete ballast removal struck the footbridge at the London end of Shalford station. To clarify, the boom of the machine came into contact with the horizontal steel section of the bridge. The Reading to Gatwick line remained closed up until peak hours – causing 349 delay minutes to 37 trains, with 12 full cancellations and 48 part-cancellations.
- 2.1.3 Innverkeilor – In November 2012 a train was derailed after striking a 60cm section of rail that had been deliberately placed on the line. The train hit the section of rail at 80mph causing the train to rise up and derail.
- 2.1.4 Eccles level crossing incident – An RRV was delivered to a level crossing rather than an access point site and left by the supplier, it caused damage to the footpath and attracted bad publicity through the local media as it was deemed unsafe.
- 2.1.5 Crush injury to slinger – In October 2014 a slinger attaching lift accessories to the excavator quick hitch when an unintentional movement of the dipper arm crushed the slinger against a stack of sheet piles causing serious life threatening injuries.
- 2.1.6 Please see below a picture of a burnt out RRV – This shows the importance of secure storage for vehicles and materials, the incident below will bring high costs to the industry and is easily preventable.



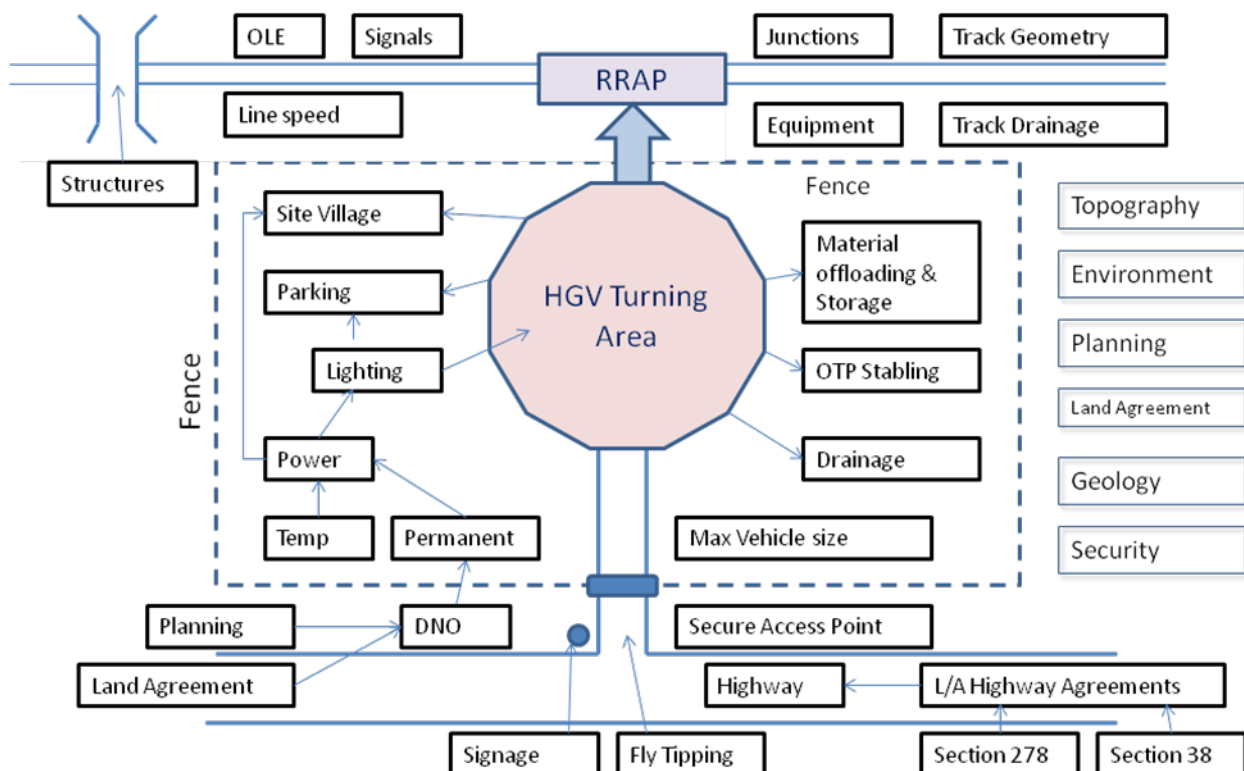
2.1.7 A Workshop was organised at the Network Rail training centre at Westwood to analyse and discuss the future for access points. The following points were the main topic of discussion:

- General issues with the existing access points
- What is best Practise and makes a good access point
- Design and security considerations

2.1.8 Table 2 below shows the results for the current issues with access points:

Access from highway	Condition of access track/road to access point
Power supply	Location
Storage space for materials	Size of RRAP – time taken to on track plant
Facilities	Condition of RRAP
Security	Lighting
Space to manoeuvre	

2.1.9 The model below defines what makes a good access point:



- 2.1.10 Using the model above and the feedback from the workshop as a starting point. The undertaking of the development of a best practise guide was initiated and the categorisation of the access points was completed as below:

Refer to Appendix B for categorisation table with full list of requirements for each category and Appendix C for the example design layout drawings.

2.2 Class 1

- 2.2.1 Pedestrian access point – Access gate, located in the boundary fence with padlock / slide bar. No vehicle parking, access from public highway / 3rd party land, used for access to track for patrolling.

2.3 Class 2

- 2.3.1 Pedestrian access point – Access gate, located in the boundary fence with padlock / slide bar. Vehicle parking for car / van available on Network Rail land, used for access to track for patrolling and light maintenance.

2.4 Class 3

- 2.4.1 OTP/OTM (small) RRAP consists of RRV access, 6m vehicle access gate, located in the boundary fence with padlock / slide bar, dedicated parking space for car / van along with limited storage space for materials. Used for RRV access light / maintenance works.

2.5 Class 4

- 2.5.1 OTP/OTM (medium) RRAP consists of RRV access, min 6m vehicle access gate & fenced compound, padlock / slide bar. Dedicated access for parking (cars / vans) / temporary accommodation / material storage / turning area for HGV and RRV.

2.6 Class 5

- 2.6.1 OTP/OTM (large) RRAP consists of RRV access – min 6m vehicle access gate & fenced compound, padlock / slide bar. Dedicated access for parking (cars/vans) / permanent accommodation / material storage / turning area for heavy good vehicles and rail plant / lighting / CCTV / drainage / welfare / permanent power supply.

This will form the basis of the benefit analysis as each element will be evaluated under the delivery management bowtie and the various subsets.

3. Benchmarking

- 3.1.1 Network Rail has been completing both efficiency and cost benchmarking since 2007/2008 and numerous reports have been produced. The benchmarking for the functions and processes of other rail networks has not been completed in the same depth. The reason for the difficulty in benchmarking is down to the fact that the railway system in Great Britain is the oldest in the world and is one of the most large and dense rail systems. It is one of the busiest railways in Europe, with 20% more train services than France, 60% more than Italy, and more than Spain, Switzerland, The Netherlands, Portugal and Norway combined. In 2013, there were 1.59 billion journeys on the National Rail network, making the British network the fifth most used in the world whilst Great Britain only ranks 23rd in world population.
- 3.1.2 To complete Benchmarking on access points a meeting was arranged with Ingeniería y Economía del Transporte SA (INECO) at the Capita headquarters in London. INECO have been working on the High speed rail network in Spain and have vast knowledge of the Spanish rail systems and processes.
- 3.1.3 As far as the data available on access points from Spanish Rail, INECO explained that the Spanish Railway network was split into 5 different owners until forming into Red Nacional de los Ferrocarriles Españoles (RENFE) in the 1940s so the only data that would be available on access points would be for the new high speed rail service that was started in 1992 and finish in 2013. The extent of this rail network and various routes is shown in the diagram below:



- 3.1.4 When explaining the findings from the recent workshop and comparing them to the experience at INECO on access points the difference in functions and processes became clear.
- 3.1.5 The process benchmarking shows that the sub - categories of supervision, briefing and communication that were discussed at the workshop is currently being implemented in Spain. The process is a track maintenance employee will brief the contractor on site and will supervise the movement and storage of materials and machinery.
- 3.1.6 The function benchmarking highlighted the difference in elements used. Appendix D details specifications for the security fencing used at INECO access points and this is of a higher level than what is utilised by Network Rail and is more likely to be seen on National Grid sites rather than being implemented on the rail network.

4. Data Analysis

4.1.1 The data research on access points was obtained from the Safety Management Information System database and individual sets of data was issued under the following categories:

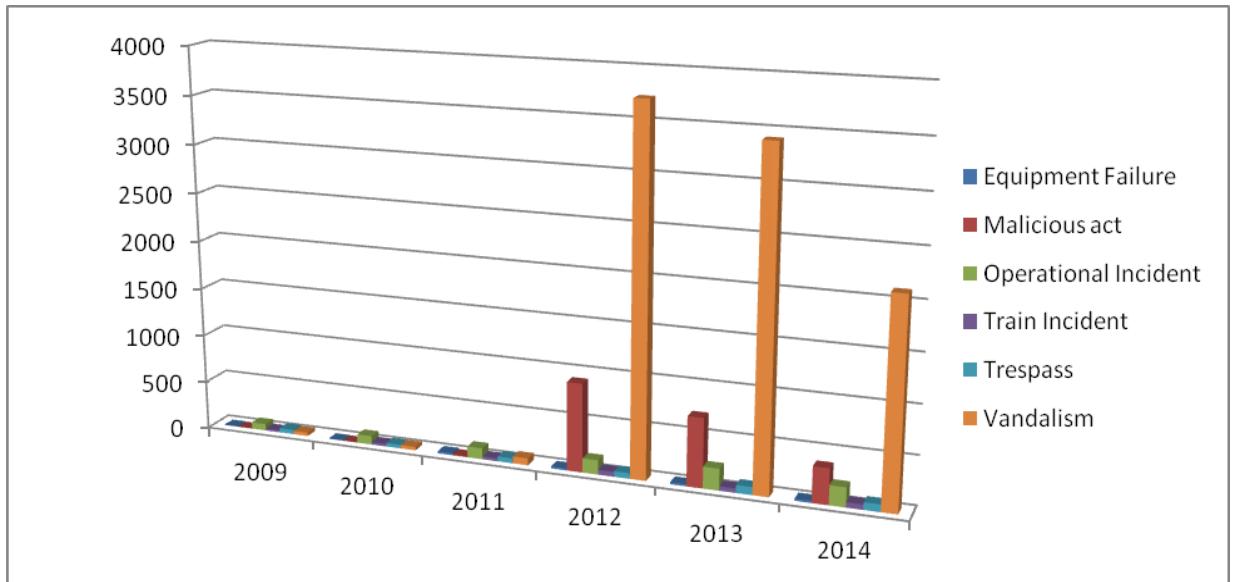
- Access Point Incidents
- Operational Close Call Risk Ranking
- Criminal Damage
- Staff Accidents

4.1.2 To analyse the data, access point incidents, operational close call risk ranking and criminal damage were combined into one data set due to the similar nature of the data and to ensure no duplication of data. The incidents in this data set was then categorised into the following primary components:

Primary Component	Example
Equipment Failure	Insecure fence / broken gate
Malicious Act	Theft of equipment / materials
Operational Incident	RRV failure on track/ RRV striking bridge
Train Incident	Train strike / derailment
Trespass	People / Animals
Vandalism	Obstruction on line / missiles thrown or fired / equipment damage

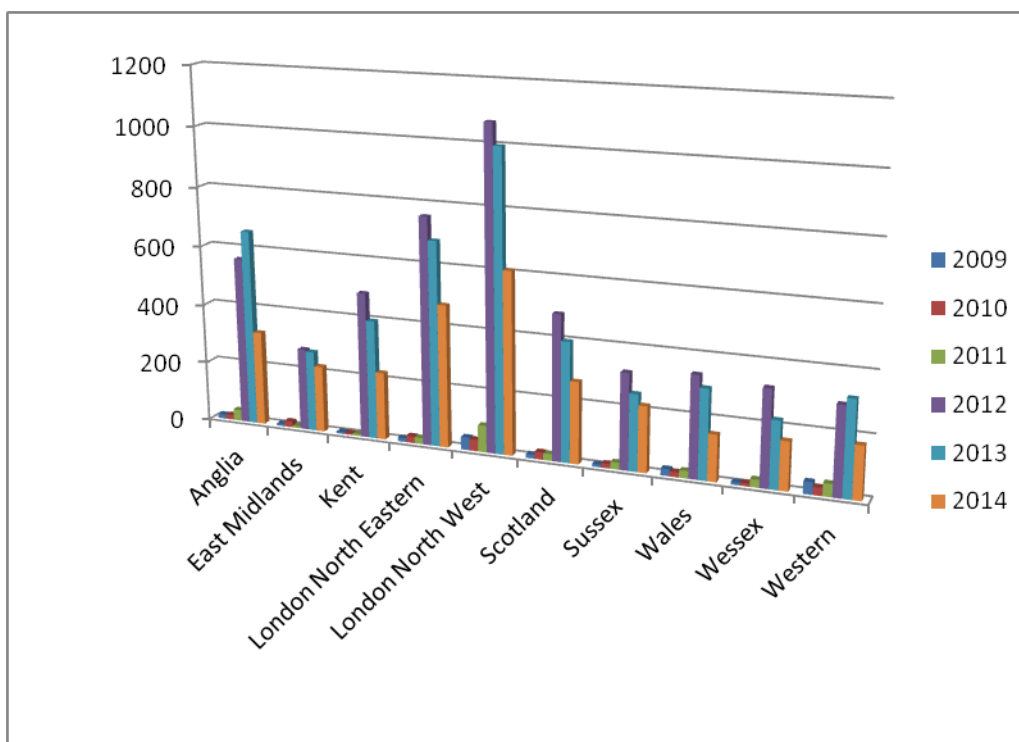
4.1.3 The total numbers of incidents for each primary component are shown in the table and graph below from 2009 to 2014. A more detailed yearly breakdown can be found in Appendix E.

Year	Equipment Failure	Malicious act	Operational Incident	Train Incident	Trespass	Vandalism	Grand Total
2009	6	3	69	20	46	36	180
2010	6	3	89	27	37	36	198
2011	22	10	115	31	52	72	302
2012	21	912	148	50	58	3727	4916
2013	21	712	223	45	81	3416	4498
2014	22	367	201	54	77	2111	2832
Grand Total	98	2007	845	227	351	9398	12926



- 4.1.4 The total number of incidents over the 6 years is close to 13,000. When putting each incident into perspective an account need to be taken for the overall cost for Network Rail. Take vandalism as an example, if the signalling equipment was damaged to the point it was no longer operational this would be an initial cost to repair and the time of the Network Rail members of staff to deal with the incident. This in turn would cause a delay to trains running on that day resulting in complaints, bad publicity and another delay noted by the ORR. This will have a knock on effect to possessions causing less work being completed per possession. This means the cost of further possessions required. When completing these scenarios for the different incidents and the costs become quite considerable.
- 4.1.5 As can be seen from the graph above the primary component with the most incidents is vandalism and malicious acts. The reason for the peak in 2012 is due to the criminal damage data being recorded, not that these incidents were not taking place in previous years. All of the components show a peak in 2012/2013 with the incidents reducing in 2014.
- 4.1.6 The table and graph below shows the number of incident over the 6 years broken down to each individual route.

NR Route	2009	2010	2011	2012	2013	2014	Grand Total
Anglia	14	16	37	563	658	317	1605
East Midlands	8	20	7	276	270	223	804
Kent	7	6	7	488	398	226	1132
London North Eastern	13	23	21	759	683	476	1975
London North West	43	39	90	1071	998	608	2849
Scotland	13	25	23	485	399	272	1217
Sussex	9	15	23	320	254	219	840
Wales	23	17	25	338	298	154	855
Wessex	9	10	26	321	223	161	750
Western	41	27	43	295	317	176	899
Grand Total	180	198	302	4916	4498	2832	12926



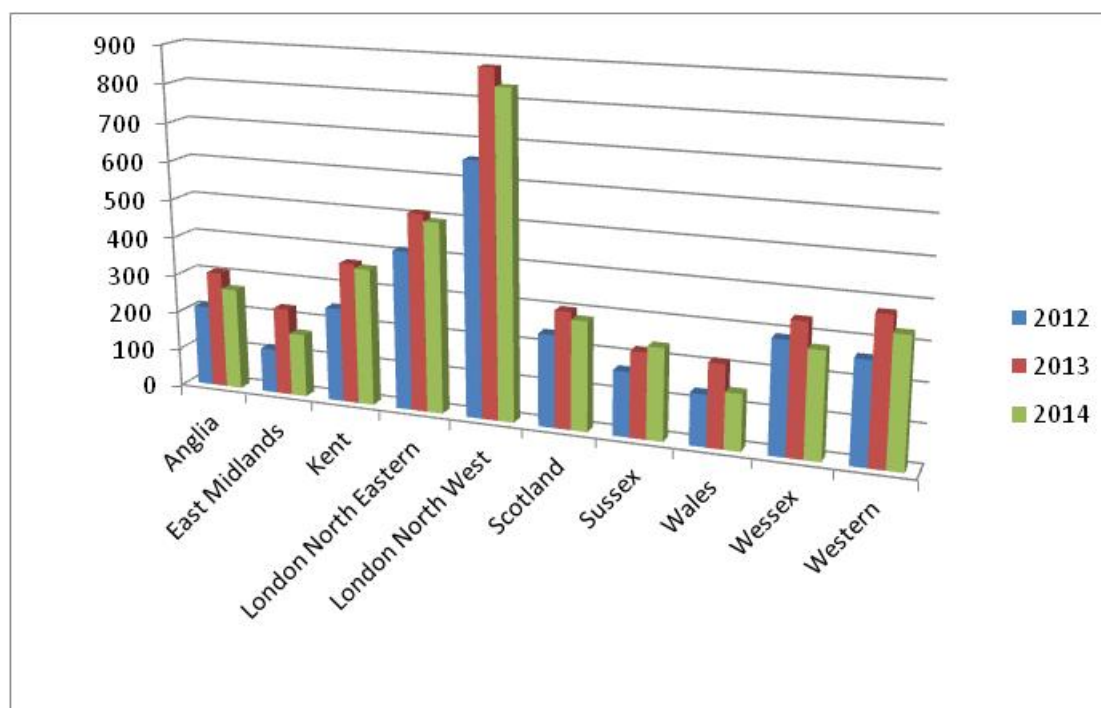
4.1.7 This shows as expected that the larger and more used routes have more incidents. Also, as mentioned earlier in the report, that the incidents peak in 2012 / 2013 and show a reduction in 2014.

4.1.8 The analysis of the staff accidents data set was completed using the categories shown and explained in the table below:

Degree of Injury	Days Absent	Example
Fatal	-	Struck by train
Major	Over 3 days	Fracture, sprain, dislocation
Minor	Up to 3 days	Slip, trip or fall
Shock/Trauma	No loss of time	Near miss

4.1.9 The total numbers of accidents from 2012 to 2014 against each route is shown in the table and graph below:

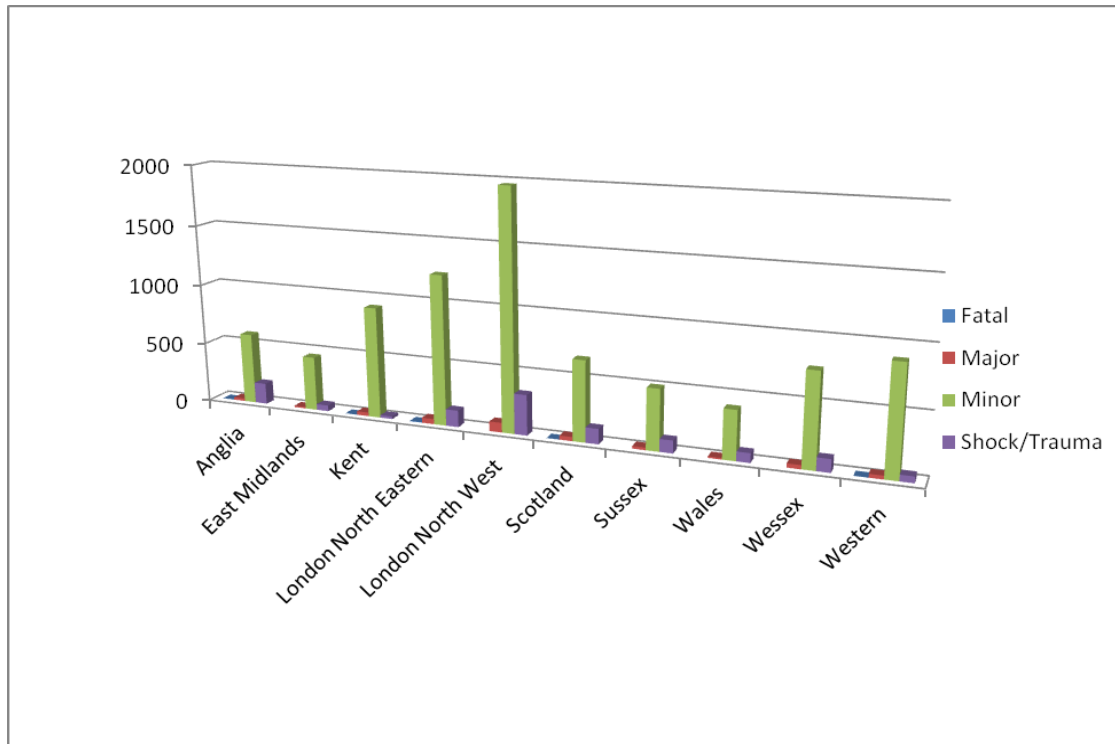
OP_ROUTE	2012	2013	2014	Grand Total
Anglia	212	307	266	785
East Midlands	116	229	165	510
Kent	246	367	357	970
London North Eastern	413	512	494	1419
London North West	657	883	838	2378
Scotland	239	302	283	824
Sussex	167	221	237	625
Wales	133	214	145	492
Wessex	290	339	274	903
Western	263	375	332	970
Grand Total	2736	3749	3391	9876



- 4.1.10 This shows that the trend of staff accidents peaked in 2013 and showed a reduction in 2014. This could be attributed to a number of things including the focus on behavioural change with Network Rails Life Saving Rules scheme.

The table and graph below shows a further breakdown of the total number of accidents under each injury category against the individual routes. A more detailed yearly breakdown can be found in Appendix E.

OP_ROUTE	Fatal	Major	Minor	Shock/Trauma	Grand Total
Anglia	1	22	588	174	785
East Midlands		12	449	49	510
Kent	1	30	918	21	970
London North Eastern	4	43	1234	138	1419
London North West		80	1965	333	2378
Scotland	1	34	663	126	824
Sussex		21	500	104	625
Wales		13	401	78	492
Wessex		33	763	107	903
Western	1	30	887	52	970
Grand Total	8	318	8368	1182	9876



- 4.1.11 As the table and graph show, the most common injury category is minor with staff having nearly 8,400 accidents over the 3 year period. That is at a high cost to Network Rail if you consider each incident can lead up to 3 days off work. That has the potential of over 25,000 working days missed by staff over the 3 years. Add the cost of the major incidents at 318 which is staff missing anything over 3 days and the emotional and financial support on staff fatalities the cost for the incidents becomes very considerable. Other costs to be taken into account similar to that discussed under the incidents evaluation would be the impact of bad publicity, the impact to Network Rail of the action taken by the ORR and the preventative measures and investigation following the accident.

5. Cost Analysis

5.1.1 The cost analysis completed is shown in Appendix F. This was evaluated using the access point classification table from the best practise design guide which states the different elements of the different access point classifications. The unit rates for each of the elements were mostly obtained from the LNW works delivery team as a worst case estimate from their own experience of upgrading access points.

5.1.2 The following elements have not been included in the assessment as they are very site specific as costs will vary depending on the location of the access point, what is specified by 3rd parties and the current condition of site:

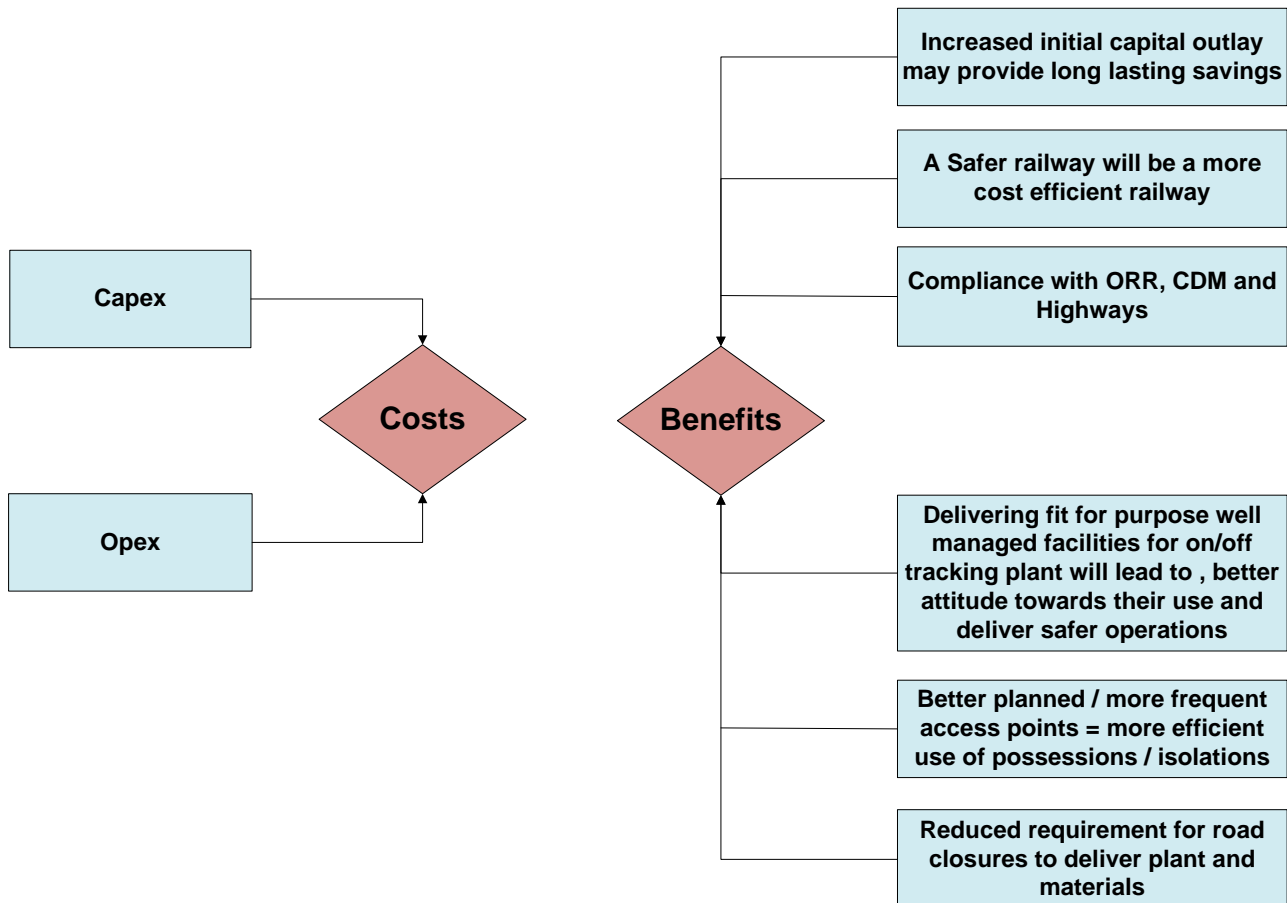
- Service connections – electricity / water
- Drainage
- Enhanced Security

5.1.3 The cost analysis was completed by applying the access point categorisation layout drawings as an example and inputting the amount for each element against the unit rate to get the initial capital costs for each of the 5 access points. These examples are shown in the table below:

Access Points Classification	Example Capital Cost
Class 1.0 Pedestrian / Vehicle Access (Car / Transit Van) Network Rail Land	£34,378.92
Class 2.0 Pedestrian / Vehicle Access (Car / Transit Van) Public Highway / 3rd Party Land	£32,866.62
Class 3.0 OTP / OTM Access (Small)	£75,034.67
Class 4.0 OTP / OTM Access (Medium)	£225,388.11
Class 5.0 OTP / OTM Access (Large)	£240,136.87

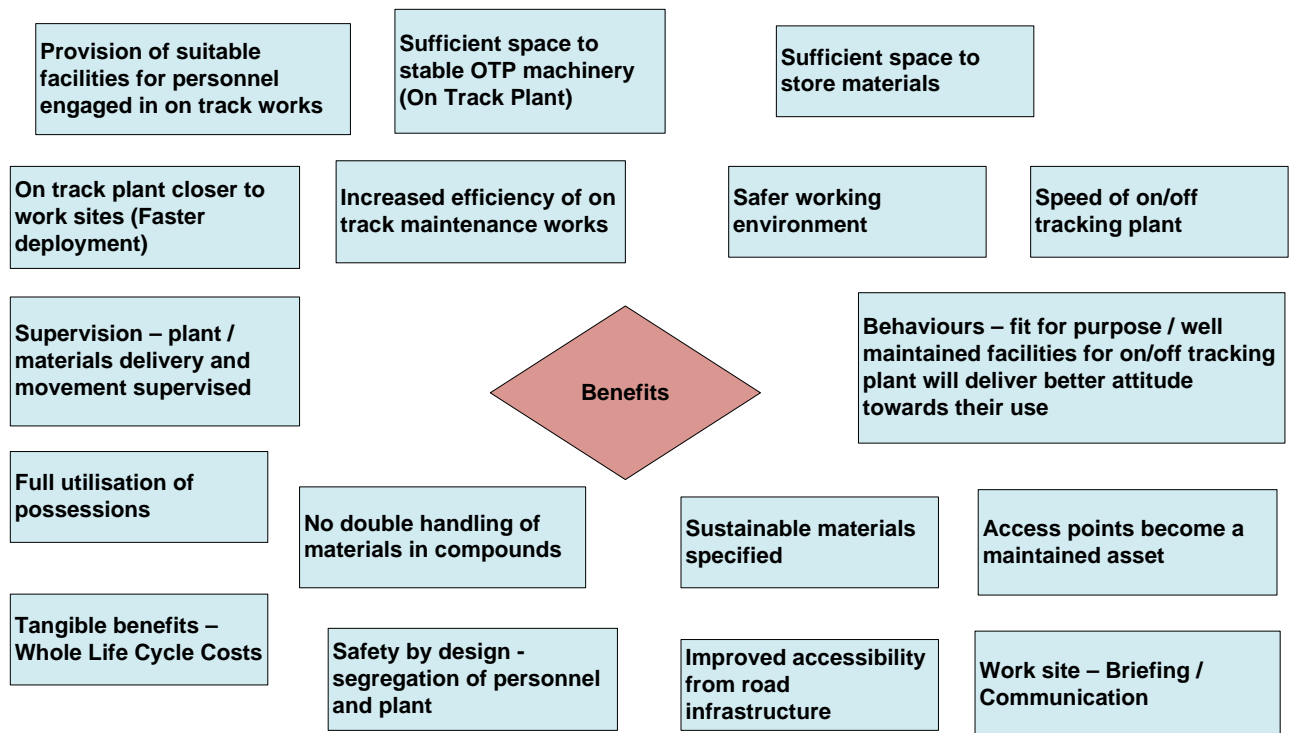
6. Benefit Analysis

6.1.1 The benefit of upgrading the access points has been analysed below using the cost - benefit model.



6.1.2 As can be seen from the model above, the costs that have been taken into account for the upgrade is not only the initial capital investment (capex) but the ongoing maintenance of the asset (opex). Unfortunately the data was not available to include the opex costs on the example sites completed but this activity could be carried out in the future to obtain the whole / life cycle cost.

6.1.3 The diagram below shows all of the benefits that were considered in a benefits brainstorm activity used to assist in the delivery of this project.



6.1.4 These benefits were then inputted into the table below to determine the stakeholders who will receive the benefit, the enablers, organisation responsible and importantly the outcome of each of these benefits. The benefits realisation table assesses each of the benefits that were discussed at the brainstorm activity and rates the priority of the benefit for the network using the benefits realisation matrix.

Benefits Realisation Matrix		
Assessment	Score	
Benefits	High Priority	1
	Medium Priority	2
	Low Priority	3

Benefit	Stakeholders	Outcome	Enablers	Responsibility	Priority
Safer Working Environment	Network Rail Contractors Customers	Less delays due to a reduction of incidents on the network. Improved safety records so less involvement and fine from the regulators	Access Point Upgrade	Network Rail	1

Full utilisation of possessions	Contractor Network Rail Customers	Less delays on track, less maintenance possessions required	Access Point Upgrade	Network Rail	1
Supervision – plant/materials delivery and movement supervised	Network Rail Contractors ORR	Reduction in safety incidents	Access Point Upgrade Change in policy	Network Rail	2
Sufficient space to stable OTP machinery	Network Rail Contractors ORR	Reduction in safety incidents	Access Point Upgrade Change in policy	Network Rail	1
Increased efficiency of on track maintenance works	Contractor Network Rail Customers	Less delays on track, less maintenance possessions required	Access Point Upgrade	Network Rail	1
Speed on/off tracking plant	Contractor Network Rail Customers	Less delays on track, less maintenance possessions required	Access Point Upgrade	Network Rail	2
Sufficient space to store materials	Contractor Network Rail	Safety onsite, costs savings	Access Point Upgrade Change in policy	Network Rail	1
Provision of facilities for on track maintenance works	Contractor Network Rail	Behaviours, environmental improvement	Access Point Upgrade Change in policy	Network Rail	2
On track plant closer to work sites enables faster deployment	Contractor Network Rail Customers	Less delays on track, less maintenance possessions required	RRAP Upgrade	Network Rail	1
No double handling of material in compound	Contractor Network Rail Customers	Less delays on track, less maintenance possessions required	Access Point Upgrade	Network Rail	2
Sustainable materials specified	Network Rail, ORR	Most sustainable solution found, most cost effective use of the budget for the routes	Policy, modelling, unit rates required to complete Whole Life Cycle Cost	Network Rail	1
Behaviours – fit for purpose / well maintained facilities for on/off tracking plant will deliver better attitude towards their use	Contractor Network Rail	Behaviours, environmental improvement	Access Point Upgrade Change in policy	Network Rail	1
Access Points become a maintained asset	Network Rail ORR	Cost savings, less delays, improved	Access Point Upgrade	Network Rail	1

		maintenance of asset will lead to most cost effective sustainable solution.	Change in policy		
Improved accessibility from road infrastructure	Contractor Network Rail Customers	Less delays on track, less maintenance possessions required	Access Point Upgrade	Network Rail	1
Tangible Benefits – Whole Life Cycle Cost	Network Rail, ORR	Most sustainable solution found, most cost effective use of the budget for the routes	Policy, modelling, unit rates required to complete Whole Life Cycle Cost	Network Rail	1
Safety by design – segregation of personnel and plant	Contractor Network Rail	Behaviours, environmental and safety improvement	Access Point Upgrade Change in policy	Network Rail	2
Work Site : briefing and communication	Contractor Network Rail	Behaviours, environmental and safety improvement	Access Point Upgrade Change in policy	Network Rail	2

6.1.5 The common theme from the benefit realisation table analysis that was undertaken above is that the high priority benefits are safety, sustainability and efficiency. secondary priorities consisting of storage and facilities. None of the benefits were seen as a low priority.

6.1.6 The benefits matrix in Appendix G is used to analyse the intangible benefits which are qualitative so therefore are a matter of opinion. The sub headings across the top have been ranked to each element to see if any trends or which sub category has the most importance and overall benefit. From the results we can see that sustainability and safety benefit heavily for the proposed upgrade of the access points.

7. Conclusion and Recommendations

7.1 Conclusion

- 7.1.1 The aim of this benefit analysis is to provide justification for the upgrade of access points. The rationale and data analysis provides examples of the cost implications of the access points remaining in their current state. The analysis shows the number of incidents and accidents at access points with also further detail provided of individual cases in the rationale. The number of cases and cost implications provides evidence that there will be a substantial cost saving from the access point upgrade.
- 7.1.2 The cost analysis was completed to provide an estimate for the capital investment required for each of the access point classifications from the best practise design guide. These examples can be used to assist and give justification in the analysis of where access points should be utilised and will have the most benefit on the route.
- 7.1.3 The benefit analysis completed shows that the key benefits from the access point upgrade would be safety, sustainability and efficiency on the network.

7.2 Recommendations

- 7.2.1 By working with Network Rail and gathering all the necessary maintenance unit rates for the different elements, Capita recommends completing the opex costs for the cost analysis template and testing the template on example sites so the whole / life cycle cost can be analysed.
- 7.2.2 To further analyse the benefits matrix in Appendix H in conjunction with Network Rail priorities. With guidance on which sub categories are most important for the Network and for Network Rail strategic planning for the future a more in-depth analysis can be completed to try and quantify the intangible benefits so they can be reviewed.
- 7.2.3 Each of the routes should be analysed on where the access points are required and which category from the best practise design guide would be best suited for the site. This would depend on a few factors such as the amount of work being completed on the line at that point, the usage of the line, location of the access point, including whether it is in a rural area or urban location. Once this analysis has been completed the cost for the upgrade of access points can be reviewed from a higher point of the overall system and priority can be given to access points in certain areas which are required more urgent and will provide the most cost effective savings for the route.

7.3 Limitations

- 7.3.1 We do not have any information on the condition or physical attributes of each access point on the Ellipse database. This means the whole life cost analysis will be site specific.
- 7.3.2 The whole life cost analysis for the cost of the elements is based on information from LNW contracts and procurement and this will not be an accurate representation for all the routes nationwide as the unit rates will vary.
- 7.3.3 Wessex route is completing the Network Rail scheme 36 access points by 2015; the internal information from this scheme is that 52 tons of redundant steel found on the railway each week on the route has funded further access points to be completed. This is a benefit but is limited as it cannot be quantified or applied to other routes. This therefore is an income that cannot be included in the whole life cost analysis.
- 7.3.4 This benefit analysis will be limited as the initial capital costs will be tangible in nature but the benefits will be mostly intangible which makes the analysis and comparison difficult. The only tangible benefit will be seen in the reduction of train delays and safety incidents.
- 7.3.5 Therefore the following common method of benefit analysis will not be utilised:

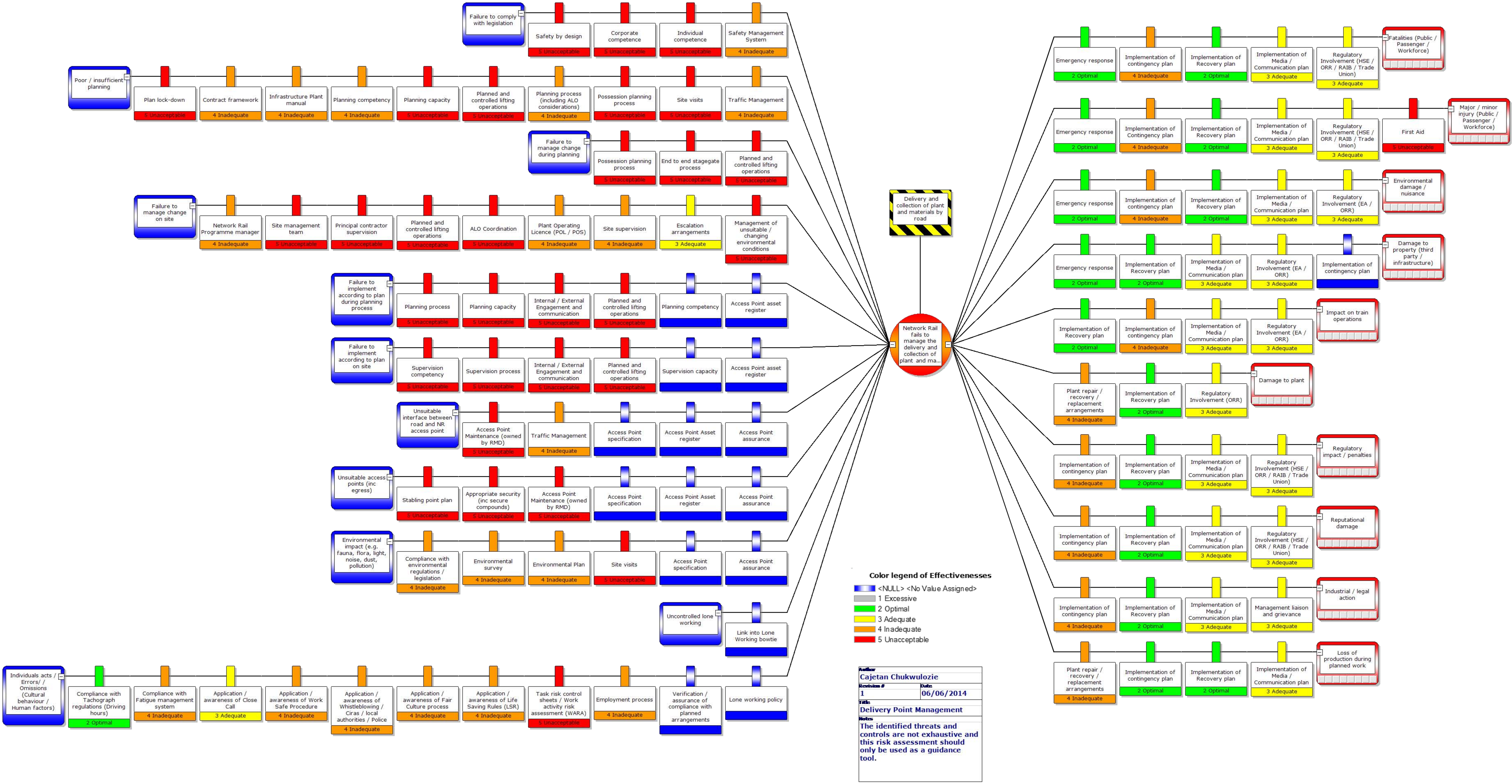
Payback – Which is the amount of time required for the cash inflows from a capital investment to equal the cash outflows.

Payback period = Initial payment / Annual cash inflow

Average Rate of Return – expresses the profits arising from a project as a percentage of the initial capital cost.

ARR – (Average annual revenue / Initial capital costs)*100

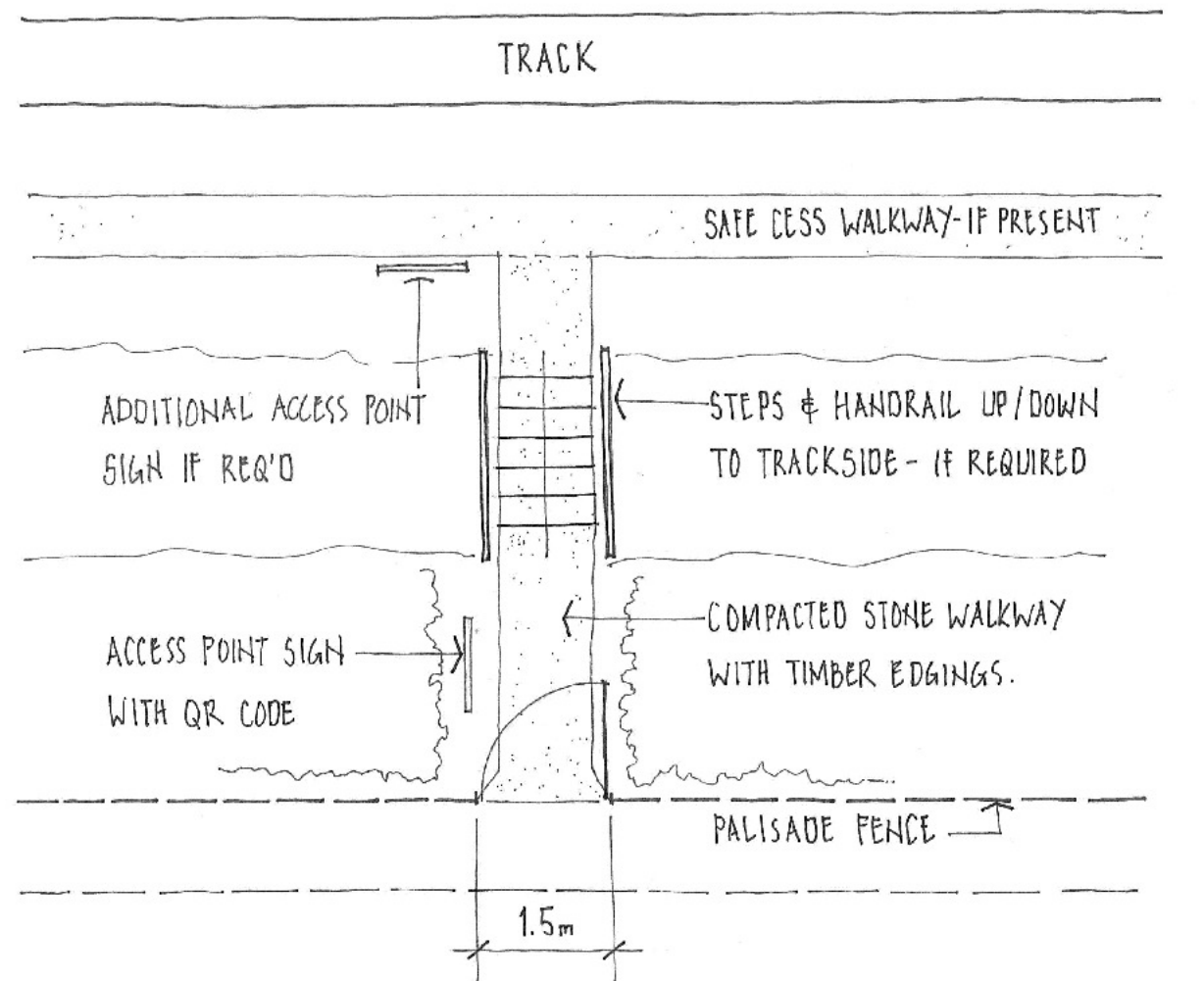
Appendix A Delivery Point Management Bow Tie



Appendix B Access Point Categorisation Table

Infrastructure Access Points - Classification Table					
Element	Class 1.0 Pedestrian / Vehicle Access (Car / Transit Van) Public Highway / 3rd Party Land	Class 2.0 Pedestrian / Vehicle Access (Car / Transit Van) Network Rail Land	Class 3.0 OTP / OTM Access (Small)	Class 4.0 OTP / OTM Access (Medium)	Class 5.0 OTP / OTM Access (Large)
Pedestrian Access	✓	✓	✓	✓	✓
Car	✓	✓	✓	✓	✓
LWB transit van	✓	✓	✓	✓	✓
7.5 – 17.0 tonne (Rigid plant)	X	X	✓	✓	✓
17.0 tonne or greater (Articulated plant)	X	X	✓	✓	✓
Walkway:	✓	✓	✓	✓	✓
Handrail: Steel / GRP/FRP	✓	✓	✓	✓	✓
Steps	✓	✓	✓	✓	✓
Access Gates: Pedestrian	✓	✓	✓	✓	✓
Access Gates: Vehicle / RRV	X	X	✓	✓	✓
Classification of vehicle / RRV size	X	X	✓	✓	✓
Roadway – MOT Type 1 (Stone)	✓	X	✓	✓	✓
Roadway – Asphalt surfacing c/w kerbing	X	X	X	X	✓
Signage – QR code / Access point information	✓	✓	✓	✓	✓
Fencing – New works / upgrades	✓	✓	✓	✓	✓
Permanent Lighting (RRAP / Roadway / compound)	X	X	X	✓	✓
Temporary lighting	X	X	✓	✓	X
Solar powered lighting (to be considered)	X	X	✓	✓	✓
Car / Van parking / off road parking	✓	X	✓	✓	✓
HGV turning area	X	X	X	✓	✓
Armco barrier - Vehicle protection	✓	X	✓	✓	✓
Removable Bollards (Steel, recyclable material)	✓	X	✓	✓	✓
Drainage (surfacing dependant)	X	X	✓	✓	✓
Welfare facilities (permanent)	X	X	X	X	✓
Welfare facilities (temporary)	X	X	✓	✓	✓
Sheltered briefing area	X	X	X	✓	✓
Material storage (S&C)	X	X	✓	✓	✓
Concrete apron for RRV vehicles	X	X	✓	✓	✓
Rail Road Access Point (RRAP)	X	X	✓	✓	✓
Demarcation of vehicle / pedestrian routes	✓	X	✓	✓	✓
Amenity Block (dry room, PPE storage)	X	X	X	X	✓
Winter provisions	X	X	✓	✓	✓
Stillage (S&C)	X	X	X	✓	✓
First aid box (locked)	X	X	✓	✓	✓
Service connections - Electricity / water	X	X	X	X	✓
Enhanced Security - Anti trespass – Level 1	✓	✓	✓	✓	✓
Enhanced Security - Enhanced – Level 2	X	X	✓	✓	✓
Enhanced Security - High – Level 3	X	X	X	X	✓

Appendix C Access Point Categorisation Layouts



CLASS 1 PEDESTRIAN / VEHICLE ACCESS POINT (CAR / VAN) NETWORK RAIL LAND (NTS)



PHOTO A - PALISADE FENCE



PHOTO B - ACCESS POINT INFORMATION SIGN



PHOTO C - PALISADE ACCESS GATE



PHOTO D - STEPS UP EMBANKMENT TO TRACKSIDE LEVEL

NOTES

1. Do not scale this drawing.
2. Refer to Network Rail Infrastructure Access Points Classification table for details

Rev	Date	By	Description of Revisions	Rev' Check
02	28.01.2015	P.J.	SECOND ISSUE	S.C.
01	17.12.2014	P.J.	FIRST ISSUE	S.C.

Client

Network Rail

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Capita Property and Infrastructure Ltd.

Project Title

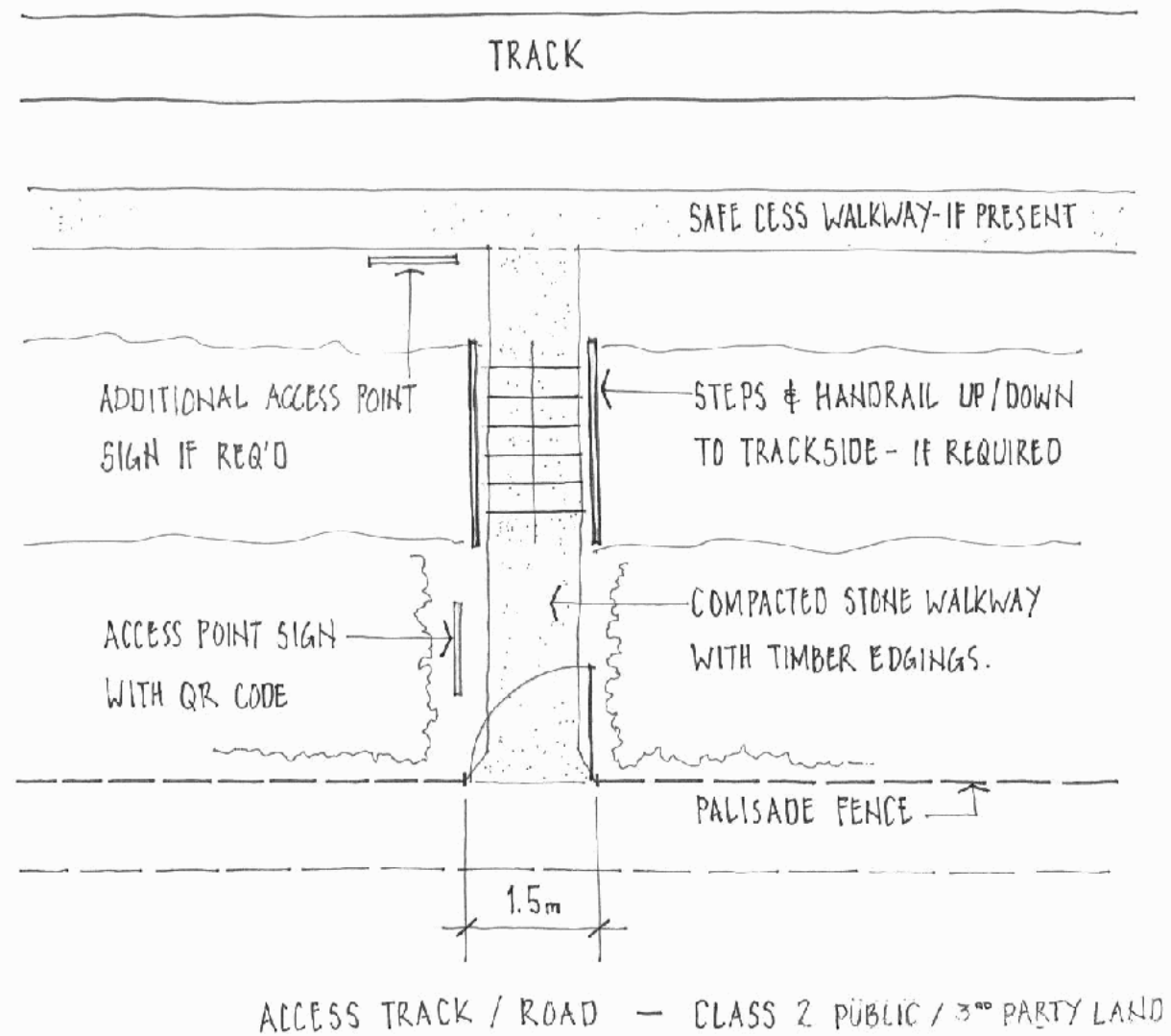
NETWORK RAIL INFRASTRUCTURE
ACCESS POINTS

Drawing Title

CLASS 1 PEDESTRIAN / VEHICLE
ACCESS POINT (CAR / VAN)
NETWORK RAIL LAND

Drawn By	Name	Sk.	Date
Checked By	Name	Sk.	Date
Approved By	Name	Sk.	Date
Scale	AS SHOWN @ A3	Sheet	1 of 1
Site Coordinates	N/A	E.R.	N/A
Charge	N/A	Revised	02

075481/AP/001



CLASS 2.0 PEDESTRIAN / VEHICLE ACCESS POINT (CAR / VAN)
PUBLIC HIGHWAY / 3rd PARTY LAND
(NTS)



PHOTO A - PALISADE FENCE



PHOTO B - ACCESS POINT INFORMATION SIGN



PHOTO C - PALISADE ACCESS GATE



PHOTO D - STEPS UP EMBANKMENT TO TRACKSIDE LEVEL

NOTES

1. Do not scale this drawing.
2. Refer to Network Rail Infrastructure Access Points Classification table for details

01	29.01.2015	P.J.	FIRST ISSUE	S.C.
Rev	Date	Name	Description of Revisions	Rev. Check

Client



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Capita Property and Infrastructure Ltd.

Project Title

NETWORK RAIL INFRASTRUCTURE
ACCESS POINTS

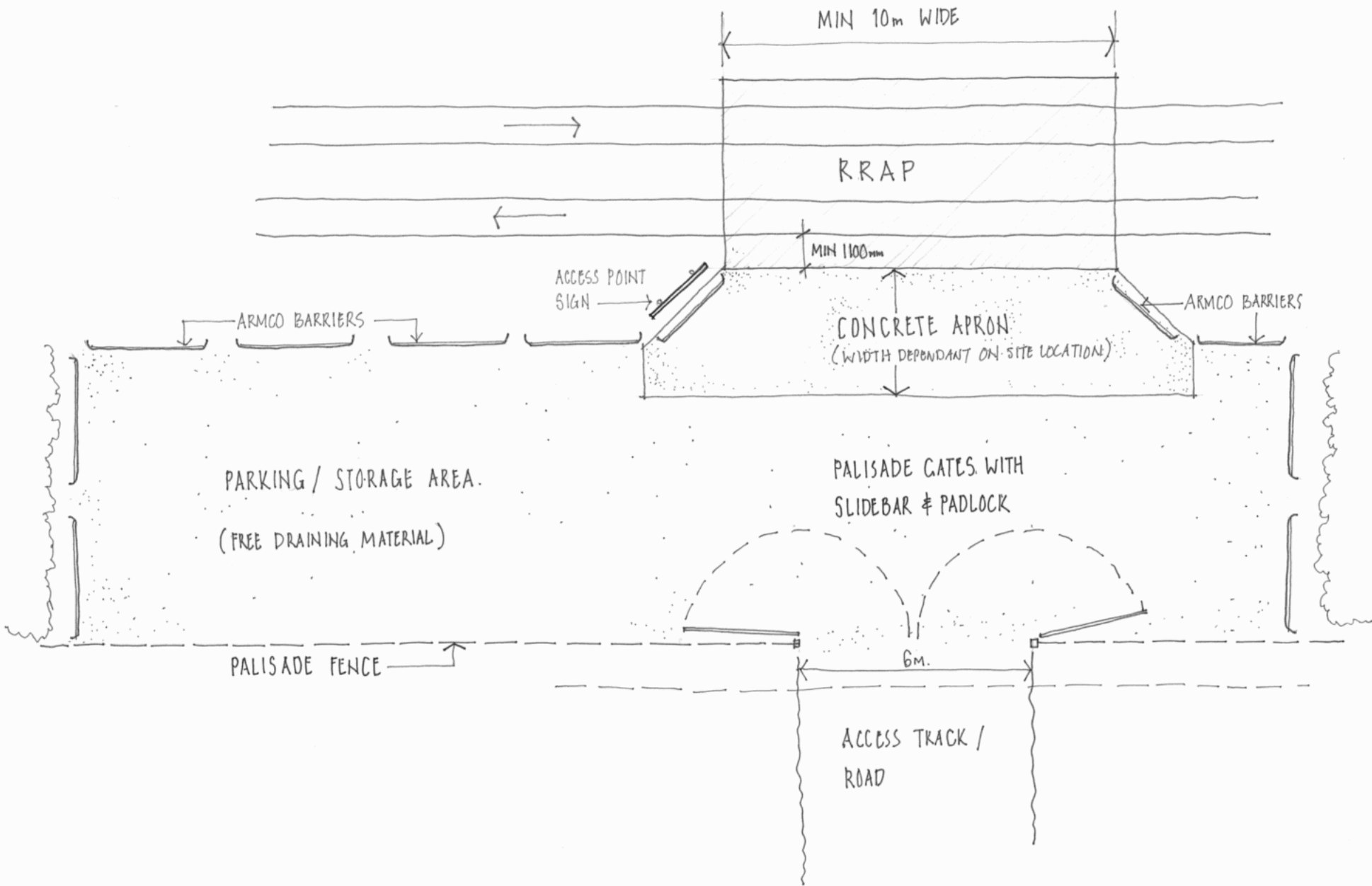
Drawing Title

CLASS 2.0 PEDESTRIAN / VEHICLE
ACCESS POINT (CAR / VAN)
PUBLIC HIGHWAY / 3rd PARTY LAND

Drawn By	Name	Sk.	Date
	P.JENYON	<i>P. Jenyon</i>	29.01.15
Checked By	Name	Sk.	Date
	S.CHAMBERS	<i>S. Chambers</i>	29.01.15
Approved By	Name	Sk.	Date
	J.SHERIDAN	<i>J. Sheridan</i>	29.01.15
Scale	AS SHOWN @ A3		Sheet 1 of 1
Site Coordinates	N/A	E.R.	N/A
Charge	N/A		
Drawing No	075481/AP/002		Revised 01

NOTES

1. Do not scale this drawing.
2. Refer to Network Rail Infrastructure Access Points Classification table for details



CLASS 3.0 OTP / OTM ACCESS POINT
SMALL (NTS)



PHOTO A - PALISADE FENCE



PHOTO B - ACCESS POINT INFORMATION
SIGN



PHOTO C - PALISADE ACCESS GATE



PHOTO D - STEPS UP EMBANKMENT
TO TRACKSIDE LEVEL

02	28.01.2015	P.J.	SECOND ISSUE	S.C.
01	17.12.2014	P.J.	FIRST ISSUE	S.C.
Rev	Date	Name	Description of Revisions	Rev Checked

Client



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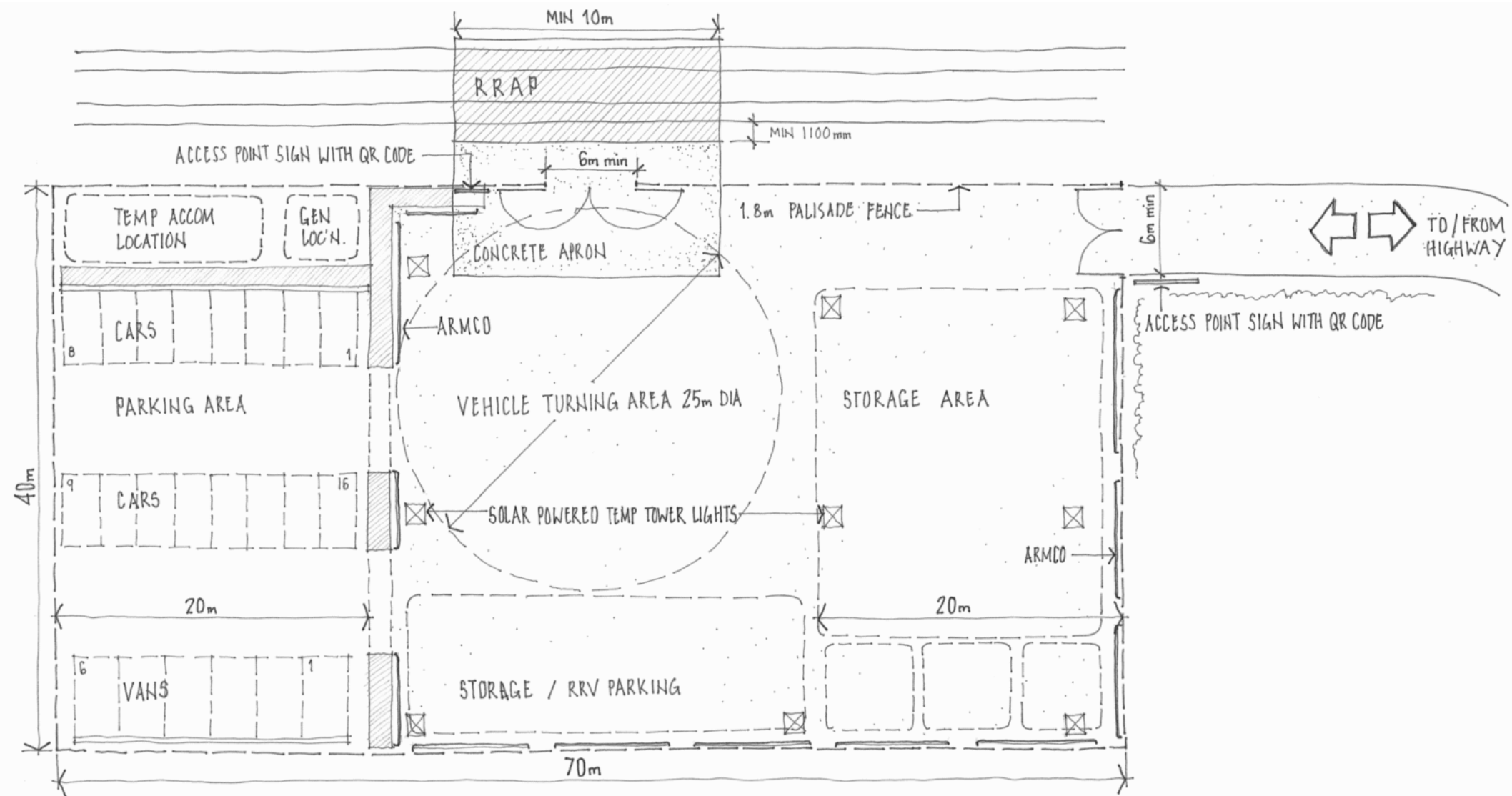
Web: www.capita.co.uk/infrastructure

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E: Special.Projects@Capita.co.uk

Capita Property and Infrastructure Ltd.

Project Title				
NETWORK RAIL INFRASTRUCTURE ACCESS POINTS				
Drawing Title				
CLASS 3.0 OTP / OTM ACCESS POINT (SMALL)				
Drawn By	Name	Sk.	Date	
	P.JENYON	<i>P. Jenyon</i>	17.12.14	
Checked By	Name	Sk.	Date	
	S.CHAMBERS	<i>S. Chambers</i>	17.12.14	
Approved By	Name	Sk.	Date	
	J.SHERIDAN	<i>J. Sheridan</i>	17.12.14	
Scale	AS SHOWN @ A3		Sheet	1 of 1
Site Co-ordinates	N/A	E.R.	N/A	Charge
Drawing No				Revised
075481/AP/003				02



CLASS 4.0 OTP / OTM ACCESS POINT
MEDIUM
(NTS)



PHOTO A - MATTING AND
CONCRETE APRON



PHOTO B - TEMPORARY OFFICE



PHOTO C - PEDESTRIAN
WALKWAY



PHOTO D - 6m WIDE PALISADE
ACCESS GATES



PHOTO E - PALISADE FENCE



PHOTO F - TYPICAL CAR
PARK SPACE



PHOTO G - STORAGE UNITS



PHOTO H - ACCESS POINT
INFORMATION SIGN

NOTES

1. Do not scale this drawing.
2. Refer to Network Rail Infrastructure Access Points Classification table for details

Rev	Date	By	Description of Revisions	Rev' Chgd
02	28.01.2015	P.J.	SECOND ISSUE	S.C.
01	17.12.2014	P.J.	FIRST ISSUE	S.C.

Client



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Capita Property and Infrastructure Ltd.

Project Title

NETWORK RAIL INFRASTRUCTURE
ACCESS POINTS

Drawing Title

CLASS 4.0 OTP / OTM ACCESS POINT
(MEDIUM)

Drawn By	NAME P.JENYON	Sk. P. Jenyon	Date 17.12.14
Checked By	NAME S.CHAMBERS	Sk. S. Chambers	Date 17.12.14
Approved By	NAME J.SHERIDAN	Sk. J. Sheridan	Date 17.12.14
Scale	AS SHOWN @ A3	Sheet 1 of 1	
Site Co-ordinates	N/A	E.R. N/A	Charge N/A
Drawings No	075481/AP/004	Revised	02

NOTES

1. Do not scale this drawing.
2. Refer to Network Rail Infrastructure Access Points Classification table for details

02	28.01.2015	P.J.	SECOND ISSUE	S.C.
01	17.12.2014	P.J.	FIRST ISSUE	S.C.
Rev	Date	Name	Description of Revisions	Rev

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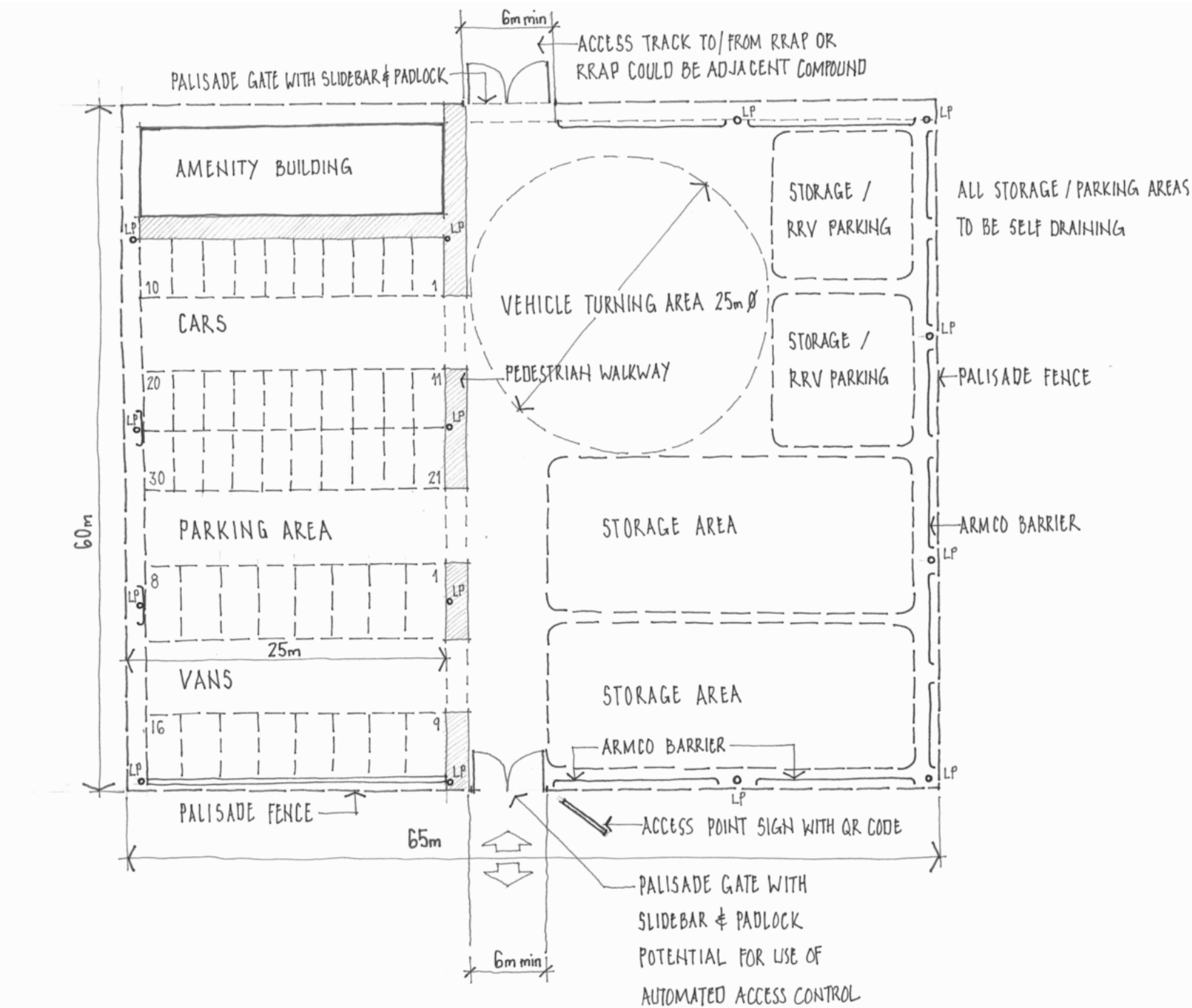
Project Title

NETWORK RAIL INFRASTRUCTURE
ACCESS POINTS

Drawing Title

CLASS 5.0 OTP / OTM ACCESS POINT
(LARGE)

Drawn By	Name	P.JENYON	Sk.	<i>P. Jenyon</i>	Date	17.12.14
Checked By	Name	S.CHAMBERS	Sk.	<i>S. Chambers</i>	Date	17.12.14
Approved By	Name	J.SHERIDAN	Sk.	<i>J. Sheridan</i>	Date	17.12.14
Scale	AS SHOWN @ A3		Sheet	1 of 1		
Site Coordinates	N/A	E.R.	N/A	Charge	N/A	
Drawing No	075481/AP/005				Revised	02



CLASS 5.0 OTP / OTM ACCESS POINT
(LARGE)
(NTS)



PHOTO A - MATTING AND
CONCRETE APRON



PHOTO B - PERMANENT OFFICE

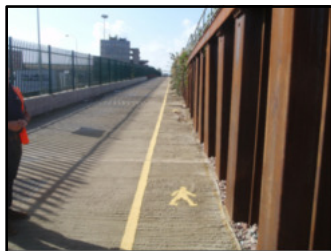


PHOTO C - PEDESTRIAN WALKWAY



PHOTO D - 6m WIDE
PALISADE ACCESS GATES



PHOTO E - PALISADE FENCE




PHOTO G - ARMCO BARRIER



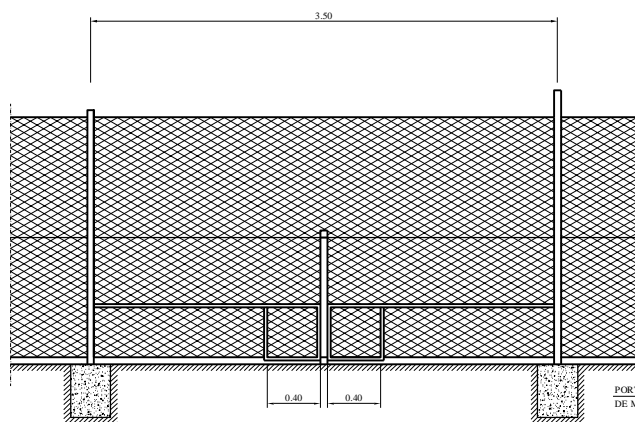
PHOTO F - TYPICAL CAR
PARK SPACE

Appendix D INECO Security Specifications

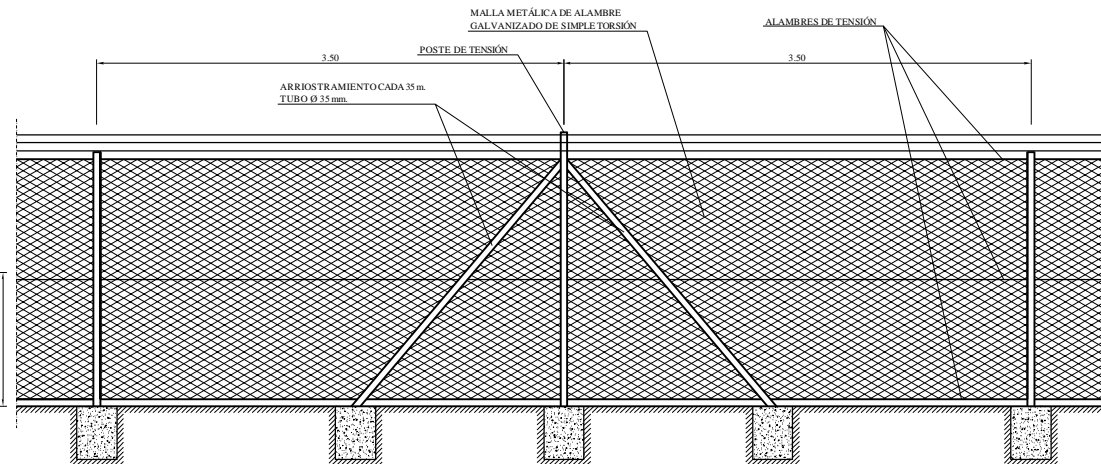
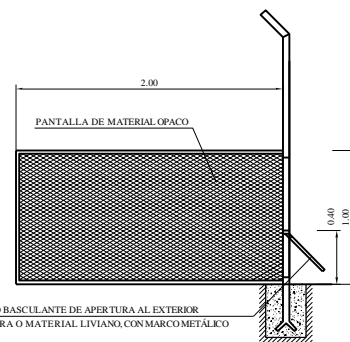
	SISTEMA DE GESTIÓN	
	INSTRUCCIONES Y RECOMENDACIONES PARA REDACCIÓN DE PROYECTOS DE PLATAFORMA	IGP – 2011

INDICE DE PLANOS

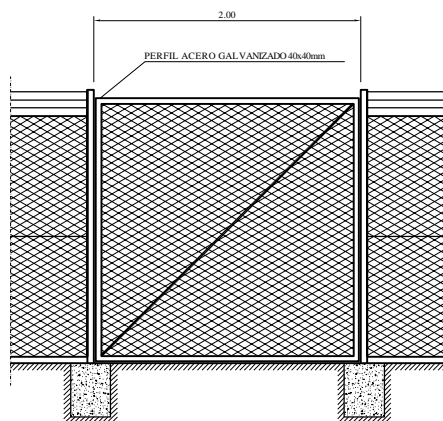
- 1.- OBRAS COMPLEMENTARIAS – CERRAMIENTO . DETALLES (1)
- 2.- OBRAS COMPLEMENTARIAS – CERRAMIENTO. DETALLES (2)
- 3.- OBRAS COMPLEMENTARIAS. CERRAMIENTO EN ZONAS URBANAS



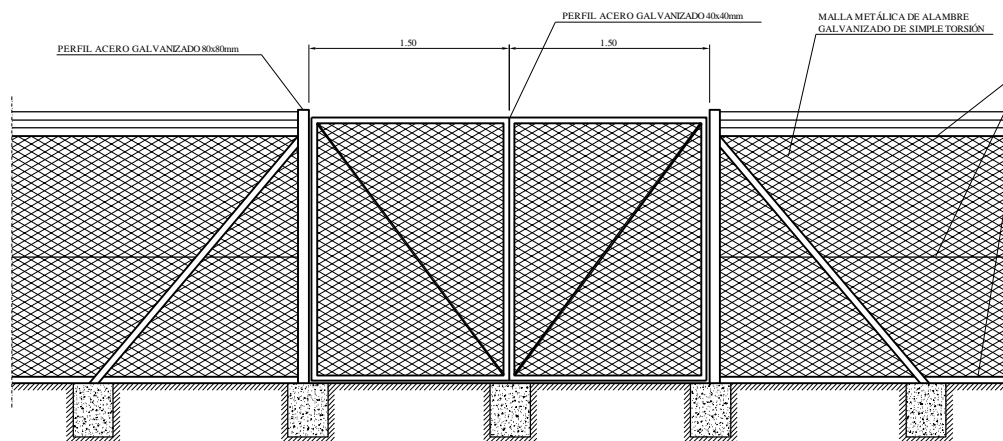
PORTILLO DE ESCAPE PARA FAUNA Y DETALLE



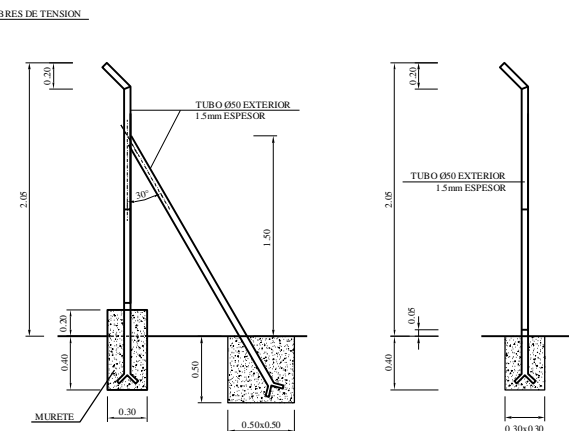
CERRAMIENTO EN ZONAS RURALES



PUERTA DE ACCESO PARA CONSERVACIÓN (1 HOJA)



PUERTA DE ACCESO PARA CONSERVACIÓN (2 HOJAS)



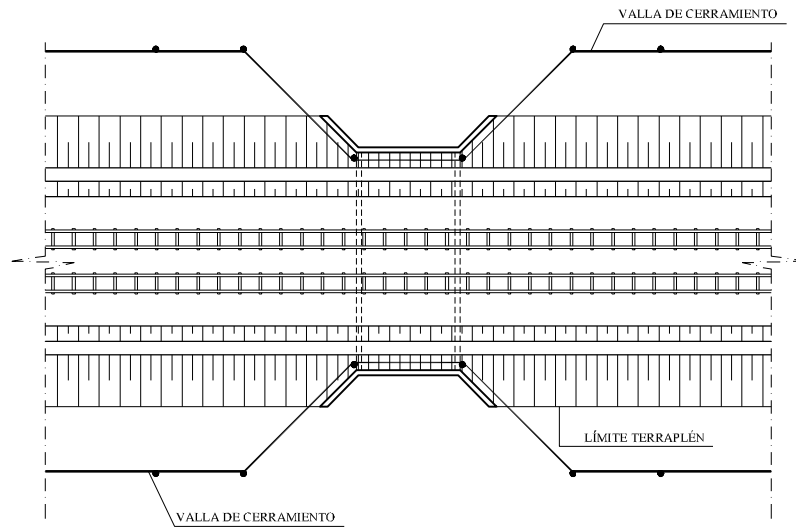
POSTE EN TRAMOS ESPECIALES (VIENTO INTENSO Y MATOJOS)

NOTA :
- LAS DIMENSIONES INDICADAS EN LAS CIMENTACIONES SE CONSIDERAN MÍNIMAS
- EL HORMIGÓN EN MACIZOS SERA HM-20

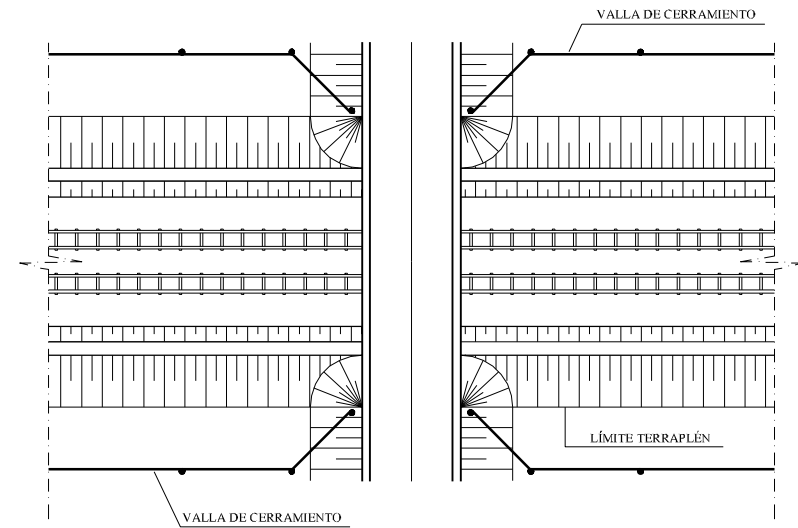
OBRAS COMPLEMENTARIAS CERRAMIENTO DETALLES

- LAS PUERTAS SE LOCALIZARÁN EN LOS PUNTOS INDICADOS EN PLANOS
- LAS PUERTAS IRÁN DOTADAS DE UN SISTEMA DE CERRADURA CON LLAVE UNIVERSAL

DETALLE COLOCACIÓN EN PASOS INFERIORES

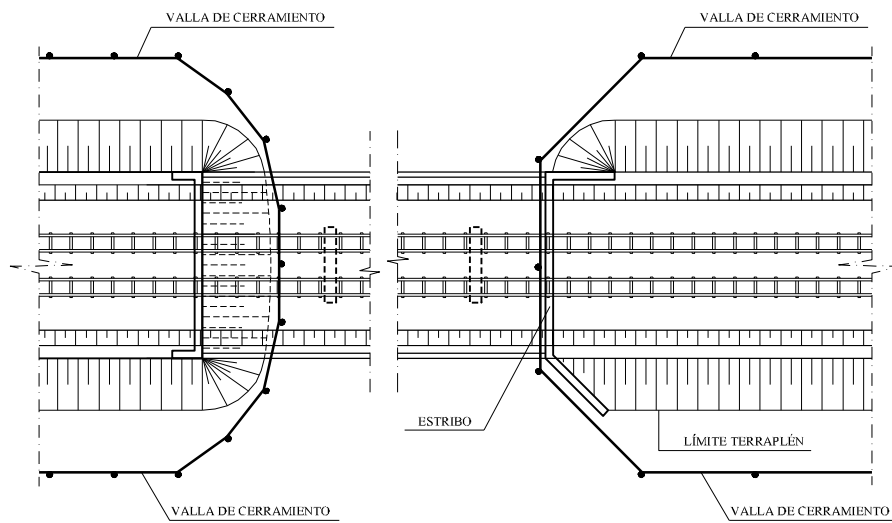


DETALLE COLOCACIÓN EN PASOS SUPERIORES

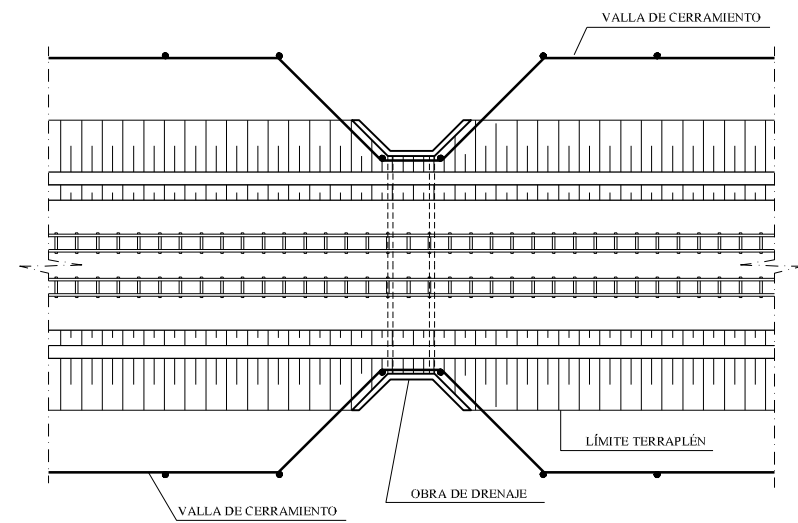


NOTA: En los casos en los que esta colocación del cerramiento interfiera con algún gálibo, se instalará apoyado en la cara exterior de las aletas y con su misma altura.

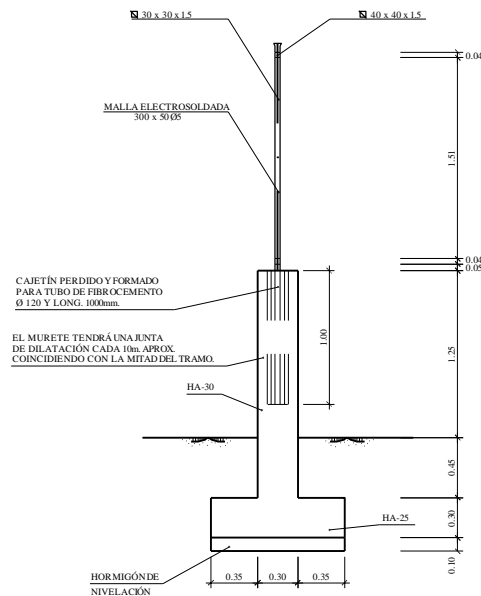
DETALLE COLOCACIÓN EN VIADUCTOS



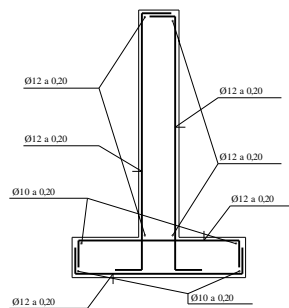
DETALLE COLOCACIÓN EN OBRAS DE DRENAJE



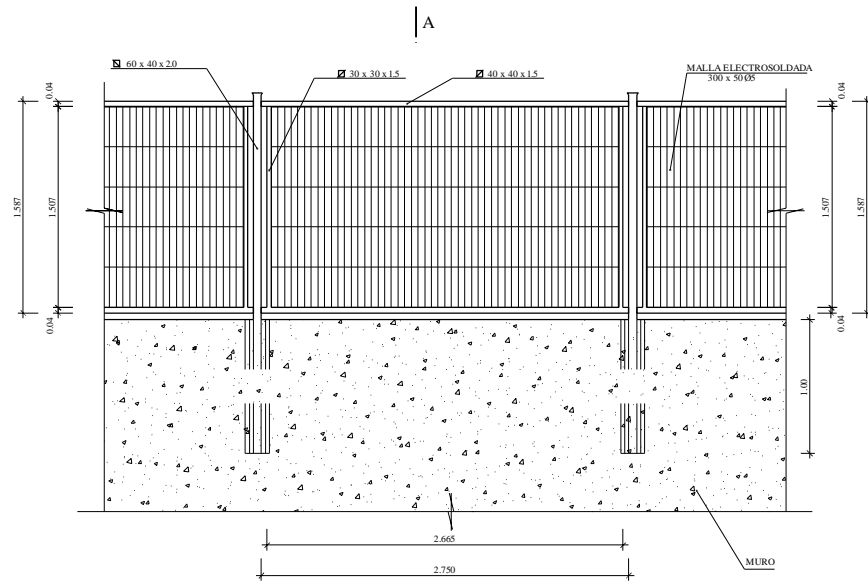
OBRAS COMPLEMENTARIAS CERRAMIENTO DETALLES



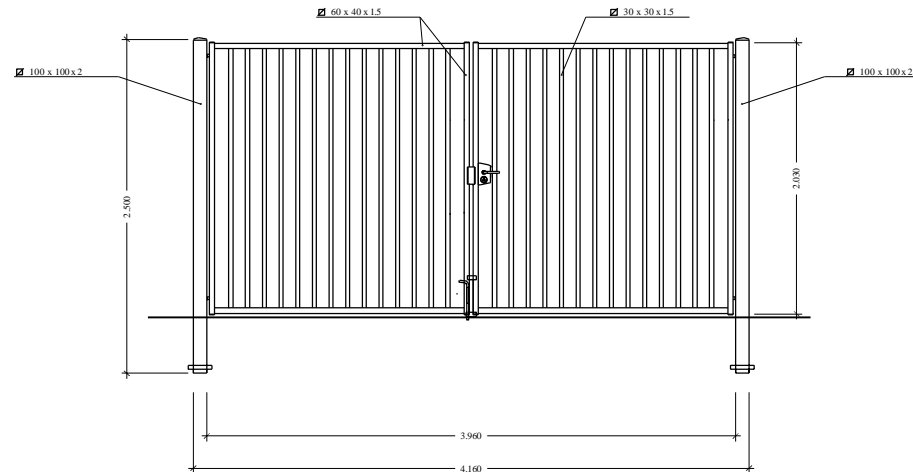
SECCION A-A



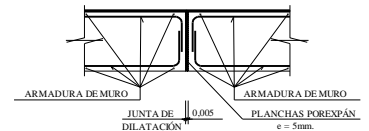
MURO
(ARMADURAS)



ALZADO



PUERTA DE CERRAMIENTO DE DOBLE HOJA (4x2m)
(14 BARROTES/HOJA)



DETALLE DE JUNTA EN MUROS

NOTAS :

- SE DISPONDRÁN PASATUBOS DE HORMIGÓN EN MASA Ø300mm. CADA 25m. A COTA DE TERRENO PARA DRENAJE SUPERFICIAL. EN LOS PASATUBOS SE COLOCARÁ UNA MALLA ELECTROSOLDADA DE 40 x 40 x 3mm. PAR EVITAR LA ENTRADA DE ANIMALES.
- BAJO LA ZAPATA SE DISPONDRÁ DE UNA CAPA DE HORMIGÓN DE 0.10 m. HL-150
- LOS EMPALMES SE REALIZARÁN POR SOLAPO EN UNA LONGITUD MÍNIMA ACORDE CON LA INSTRUCCIÓN EHE.
- LOS RECUBRIMIENTOS SERÁN DE 3.5 cm. EN ALZADOS Y 4 cm. EN ZAPATAS.

CUADRO DE CONTROL

MATERIAL	ELEMENTOS	DESIGNACION	NIVEL DE CONTROL	COEFICIENTE
HORMIGÓN	NIVELACIÓN	HL-150/P-20	HORMIGÓN NO ESTRUCTURAL	
	CIMENTOS	HA-25/P/20/IIa	INTENSO	$\gamma_c = 1.50$
	ALZADOS	HA-30/P/20/IIb	INTENSO	$\gamma_c = 1.50$
ACERO	PASIVAS	B-500-S	INTENSO	$\gamma_s = 1.15$
EJECUCIÓN	CIMENTOS	—	INTENSO	$\gamma_{gt} = \gamma_{qt} = 1.50$
	ALZADOS	—	INTENSO	$\gamma_{gt} = \gamma_{qt} = 1.50$

DOSIFICACIÓN DE HORMIGÓN

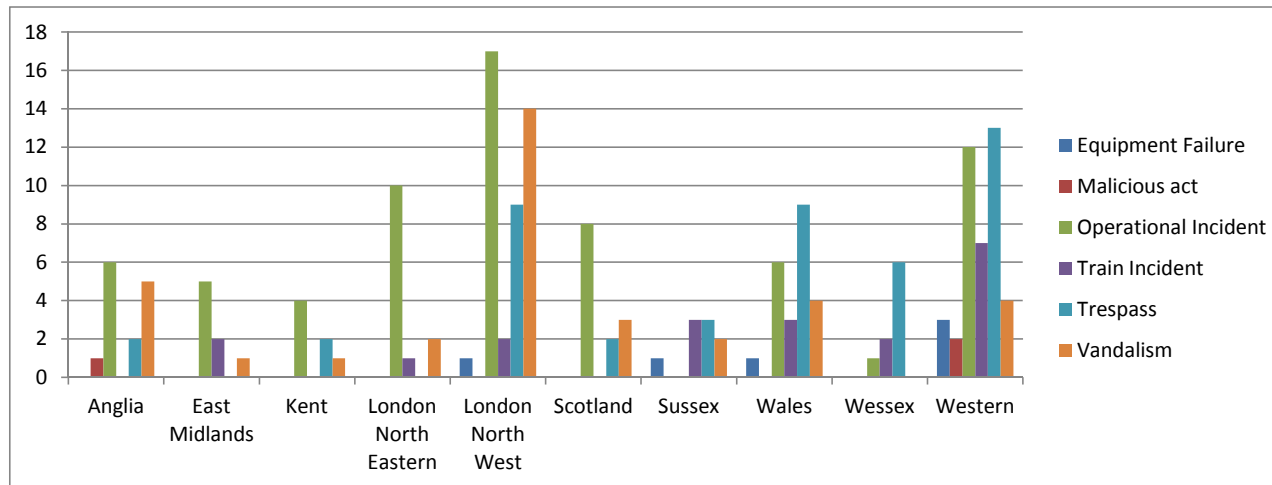
ELEMENTOS	TIPO	MÁXIMA RELACIÓN AGUA/CEMENTO	CONTENIDO MÍNIMO DE CEMENTO
CIMENTOS	HA-25/P/20/IIa	0.60	275Kg/m ³
ALZADOS	HA-30/P/20/IIb	0.55	300Kg/m ³

OBRAS COMPLEMENTARIAS CERRAMIENTOS EN ZONA URBANA DETALLES

Appendix E Data Analysis

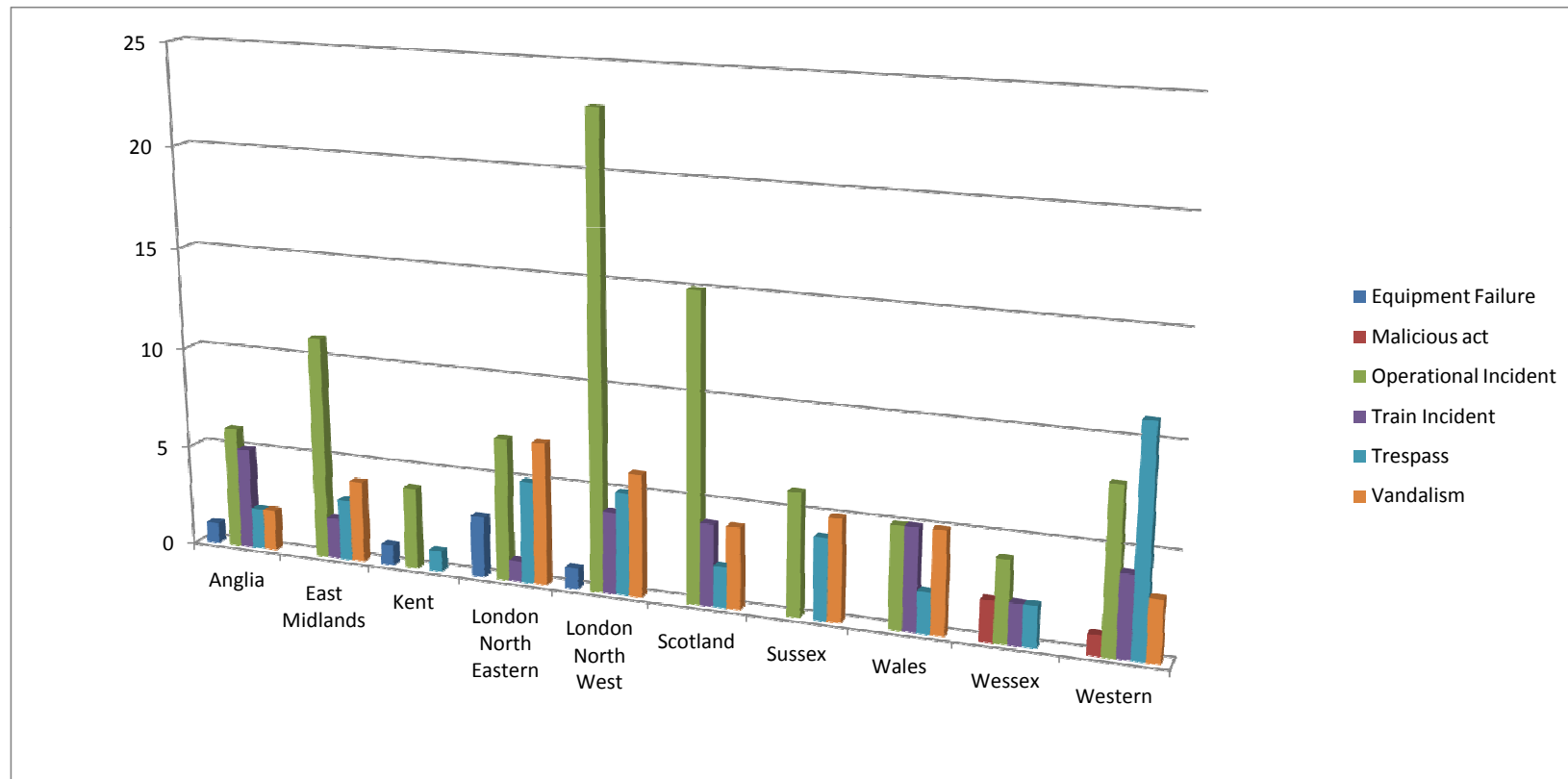
2009 Access Point Incident Analysis

Count of Primary Component	Primary Component						
NR Route	Equipment Failure	Malicious act	Operational Incident	Train Incident	Trespass	Vandalism	Grand Total
Anglia			1	6		2	5
East Midlands				5	2		1
Kent				4		2	1
London North Eastern				10	1		2
London North West		1		17	2	9	14
Scotland				8		2	3
Sussex		1			3	3	2
Wales		1		6	3	9	4
Wessex				1	2	6	
Western		3	2	12	7	13	4
Grand Total		6	3	69	20	46	36
							180



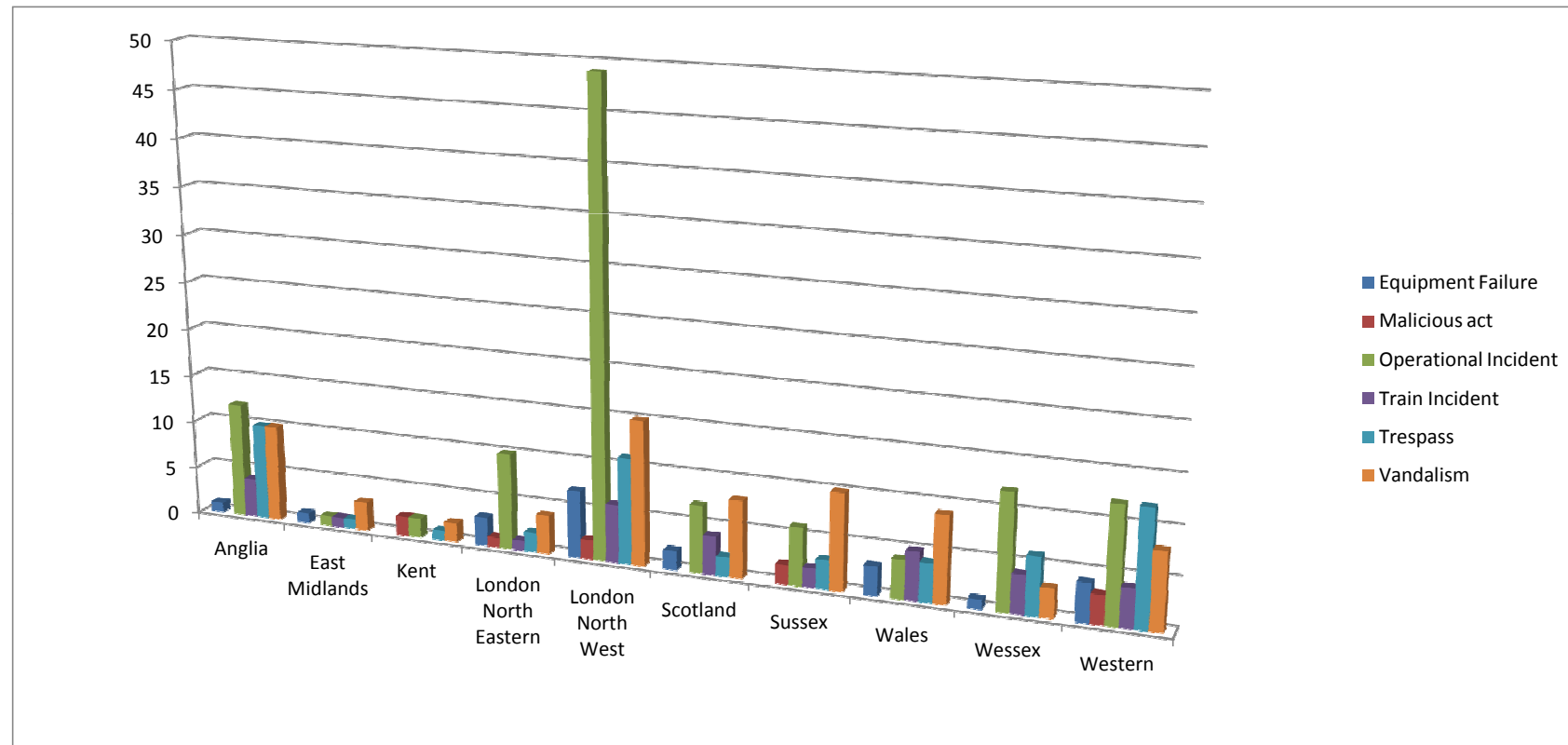
2010 Access Point Incident Analysis

Sum of primcomp2	Primary Component						
NR Route	Equipment Failure	Malicious act	Operational Incident	Train Incident	Trespass	Vandalism	Grand Total
Anglia		1		6	5	2	2
East Midlands				11	2	3	4
Kent		1		4		1	
London North Eastern		3		7	1	5	7
London North West		1		23	4	5	6
Scotland				15	4	2	4
Sussex				6		4	5
Wales				5	5	2	5
Wessex			2	4	2	2	
Western			1	8	4	11	3
Grand Total	6	3		89	27	37	36
							198



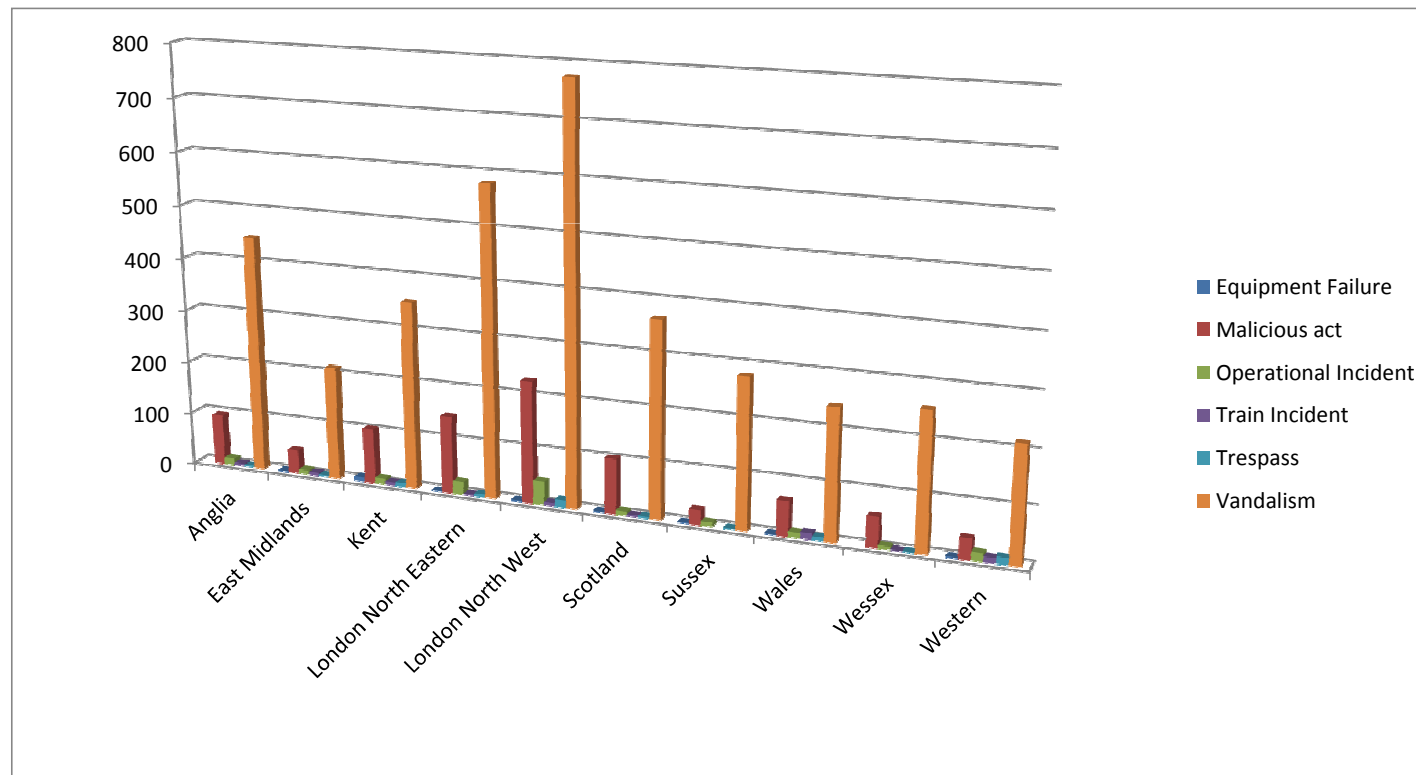
2011 Access Point Incident Analysis

Sum of primcomp2	Primary Component							
NR Route	Equipment Failure	Malicious act	Operational Incident	Train Incident	Trespass	Vandalism		Grand Total
Anglia		1		12	4	10	10	37
East Midlands		1		1	1	1	3	7
Kent			2	2		1	2	7
London North Eastern		3	1	10	1	2	4	21
London North West		7	2	49	6	11	15	90
Scotland		2		7	4	2	8	23
Sussex			2	6	2	3	10	23
Wales		3		4	5	4	9	25
Wessex		1		12	4	6	3	26
Western		4	3	12	4	12	8	43
Grand Total	22	10	115	31	52	72	302	



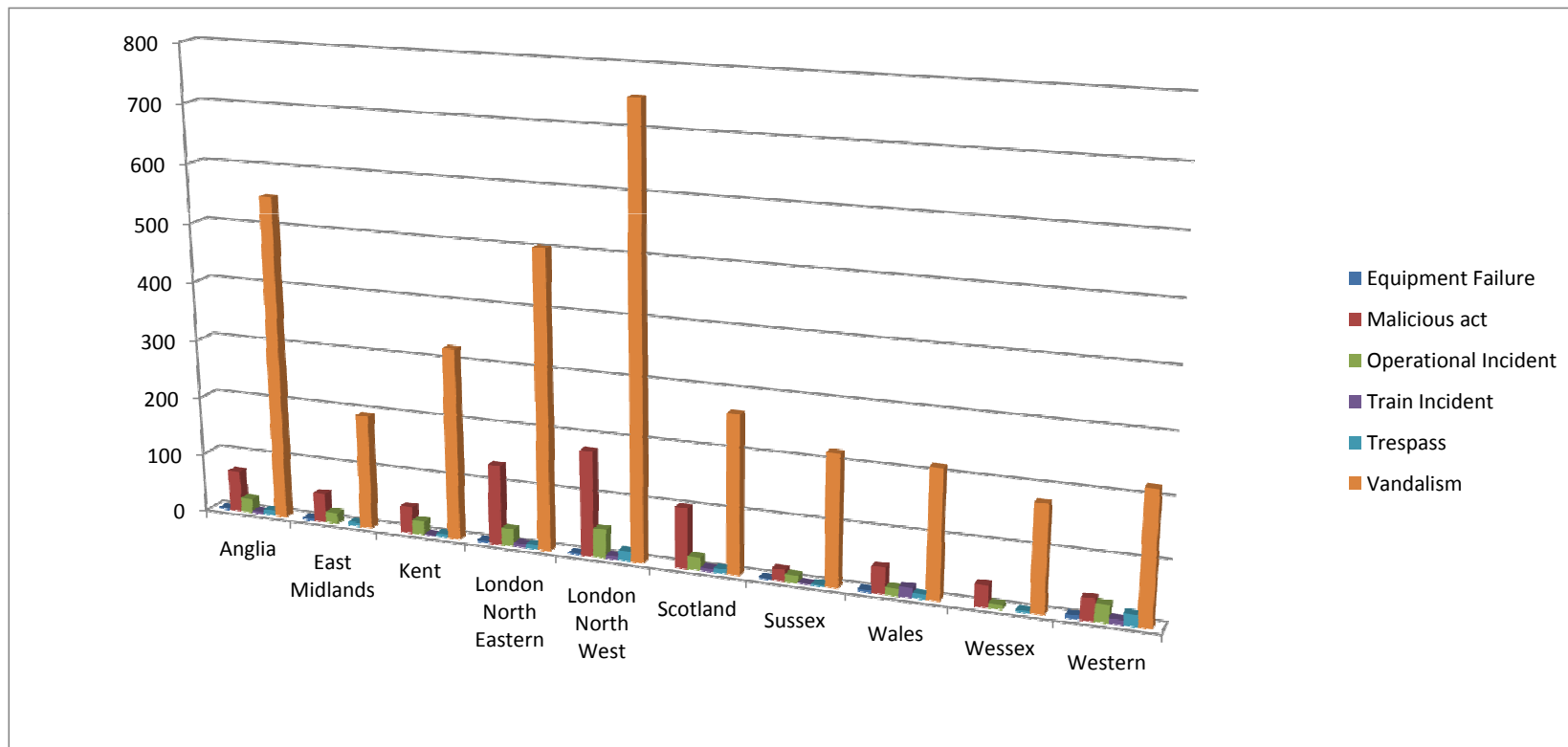
2012 Access Point Incident Analysis

Sum of primcomp2	Primary Component						
NR Route	Equipment Failure	Malicious act	Operational Incident	Train Incident	Trespass	Vandalism	Grand Total
Anglia			96	13	5	3	446
East Midlands	2	45		8	5	3	213
Kent	8	104		11	6	7	352
London North Eastern	1	146		24	2	5	581
London North West	3	229		44	6	14	775
Scotland	2	103		8	3	3	366
Sussex	2	28		8		2	280
Wales	1	65		10	12	7	243
Wessex		57		6	1	1	256
Western	2	39		16	10	13	215
Grand Total	21	912		148	50	58	4916



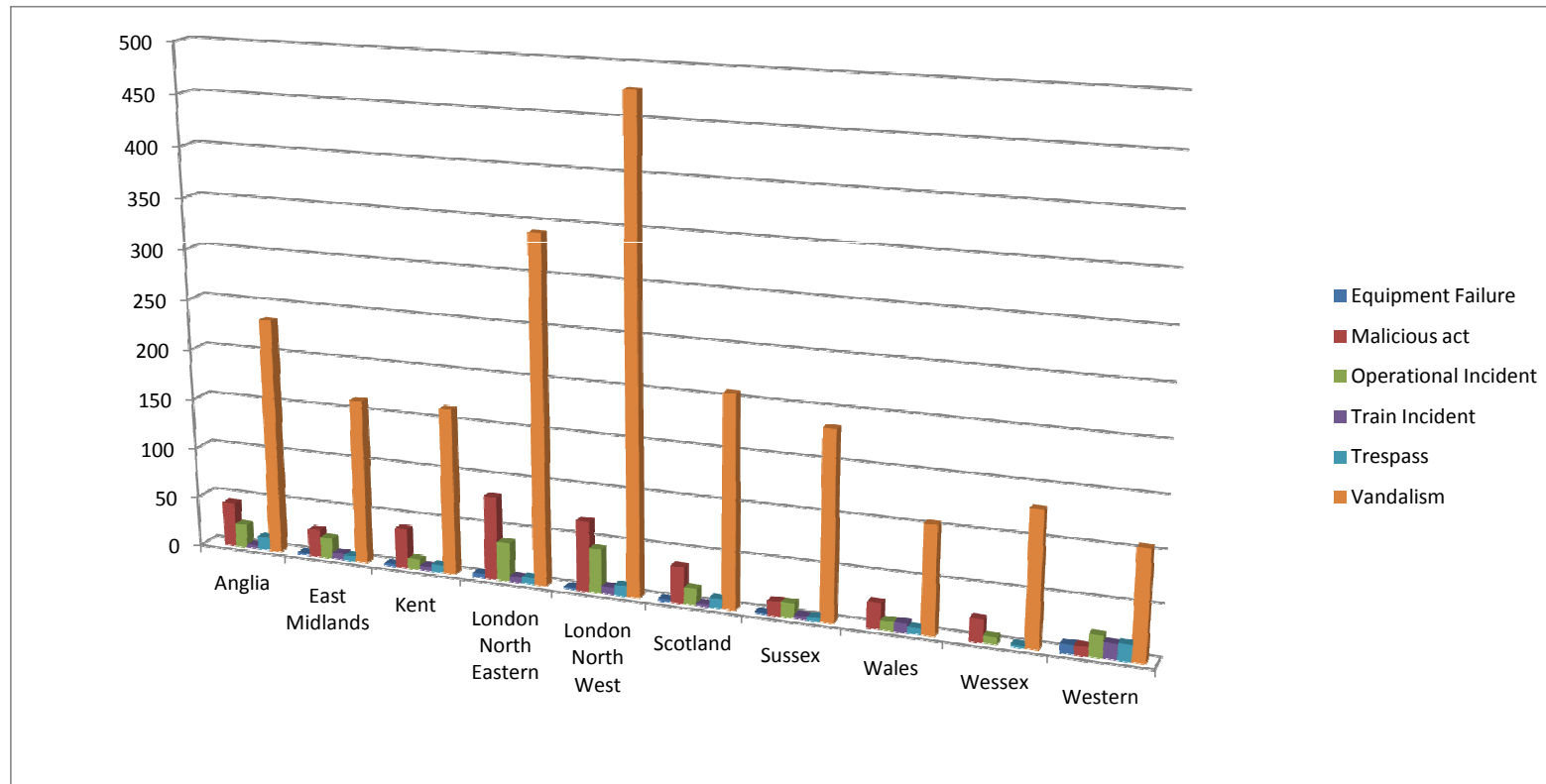
2013 Access Point Incident Analysis

Sum of primcomp2	Primary Component						Grand Total
NR Route	Equipment Failure	Malicious act	Operational Incident	Train Incident	Trespass	Vandalism	
Anglia		2	70	24	3	8	551
East Midlands		3	49	18		6	194
Kent			45	23	1	5	324
London North Eastern		3	135	29	6	7	503
London North West		2	177	48	5	16	750
Scotland			101	21	5	7	265
Sussex		1	19	12	1	2	219
Wales		4	44	12	16	8	214
Wessex			36	7		3	177
Western		6	36	29	8	19	219
Grand Total		21	712	223	45	81	3416



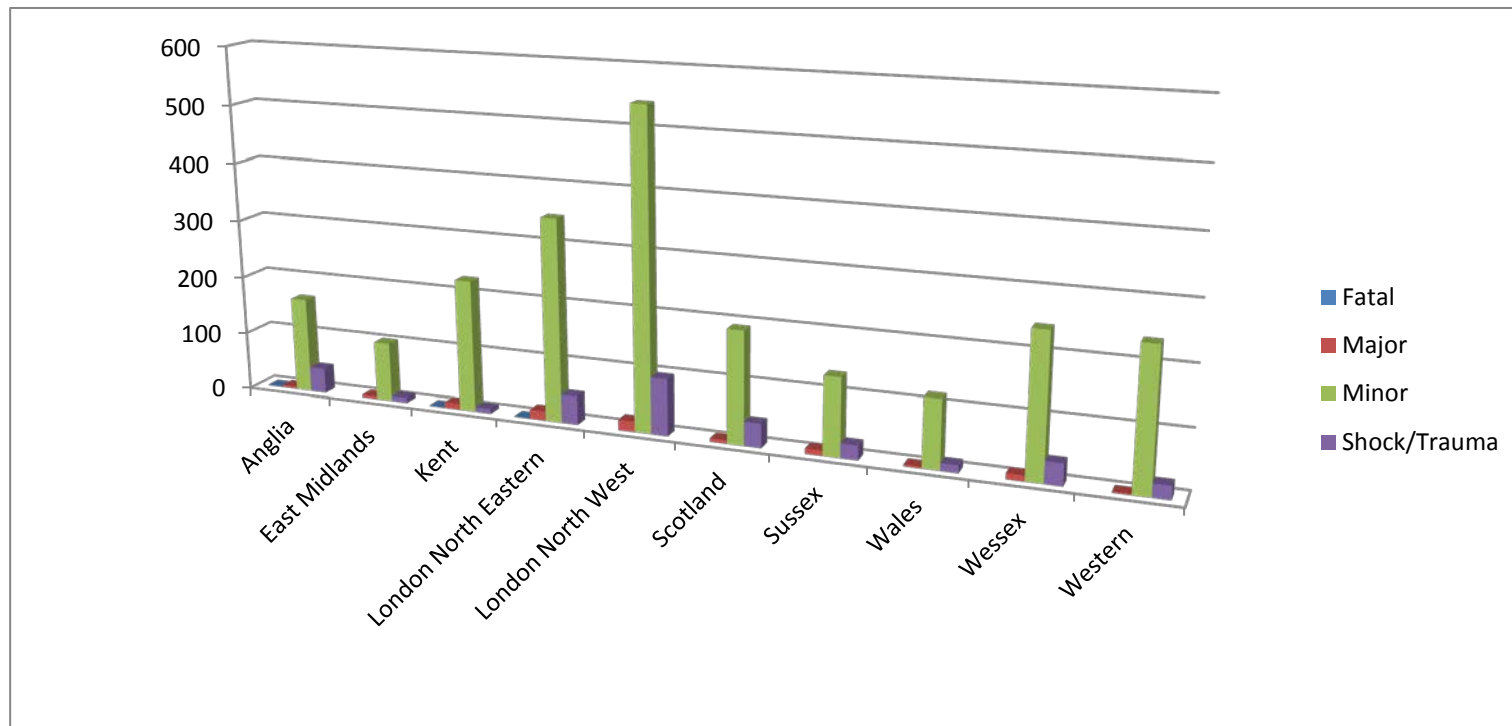
2014 Access Point Incident Analysis

Sum of primcomp2	Primary Component						
NR Route	Equipment Failure	Malicious act	Operational Incident	Train Incident	Trespass	Vandalism	Grand Total
Anglia			44	23	3	13	234
East Midlands	2		27	20	6	5	163
Kent	2		39	10	4	7	164
London North Eastern	4		82	38	5	6	341
London North West	2		69	43	7	10	477
Scotland	2		36	16	2	9	207
Sussex	1		14	14	3	3	184
Wales			25	9	9	6	105
Wessex			22	7		2	130
Western	9		9	21	15	16	106
Grand Total	22		367	201	54	77	2111



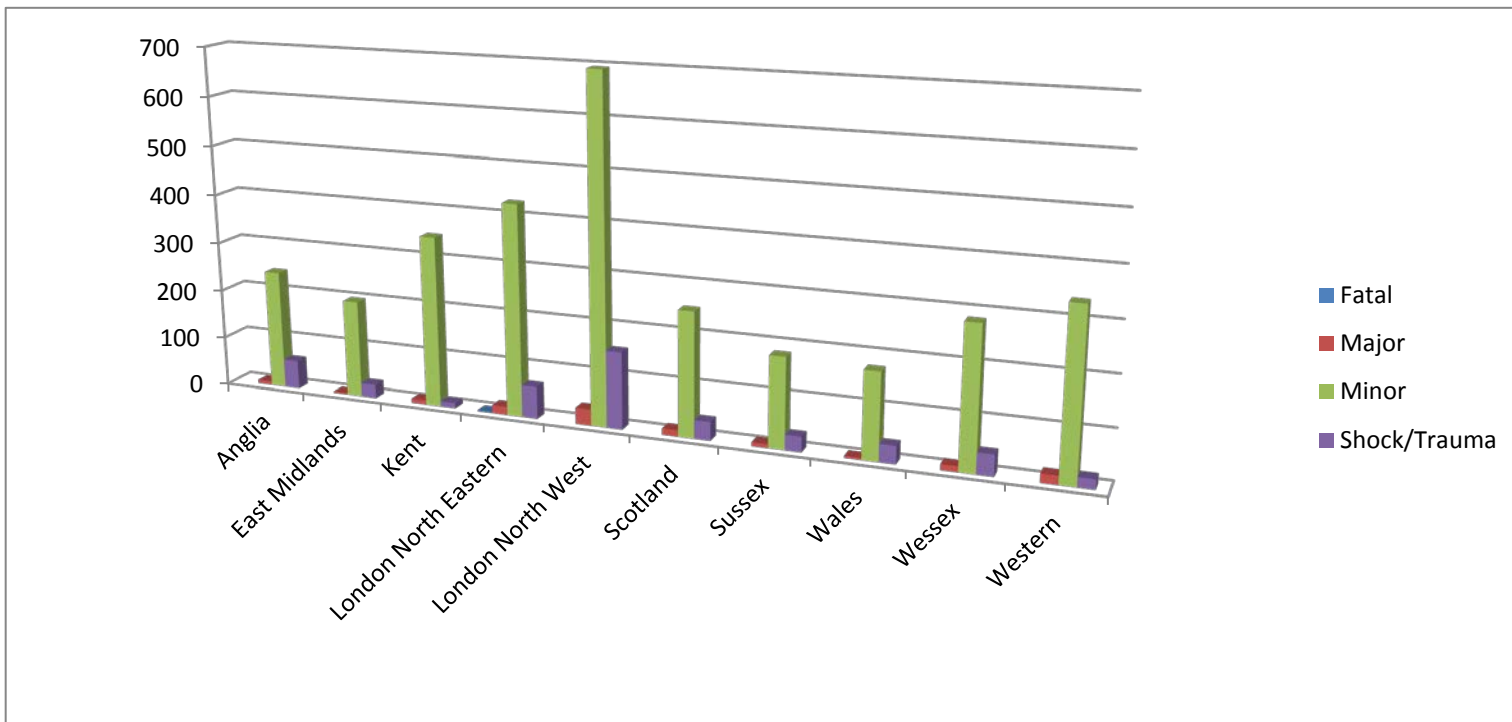
2012 Staff Accident Analysis

Sum of injdeg2	INJURY DEGREE					
OP_ROUTE	Fatal	Major	Minor	Shock/Trauma	Grand Total	
Anglia		1	4	164	43	212
East Midlands			5	102	9	116
Kent		1	10	227	8	246
London North Eastern		1	16	347	49	413
London North West			18	542	97	657
Scotland			6	192	41	239
Sussex			9	133	25	167
Wales			3	117	13	133
Wessex			10	243	37	290
Western			2	238	23	263
Grand Total		3	83	2305	345	2736



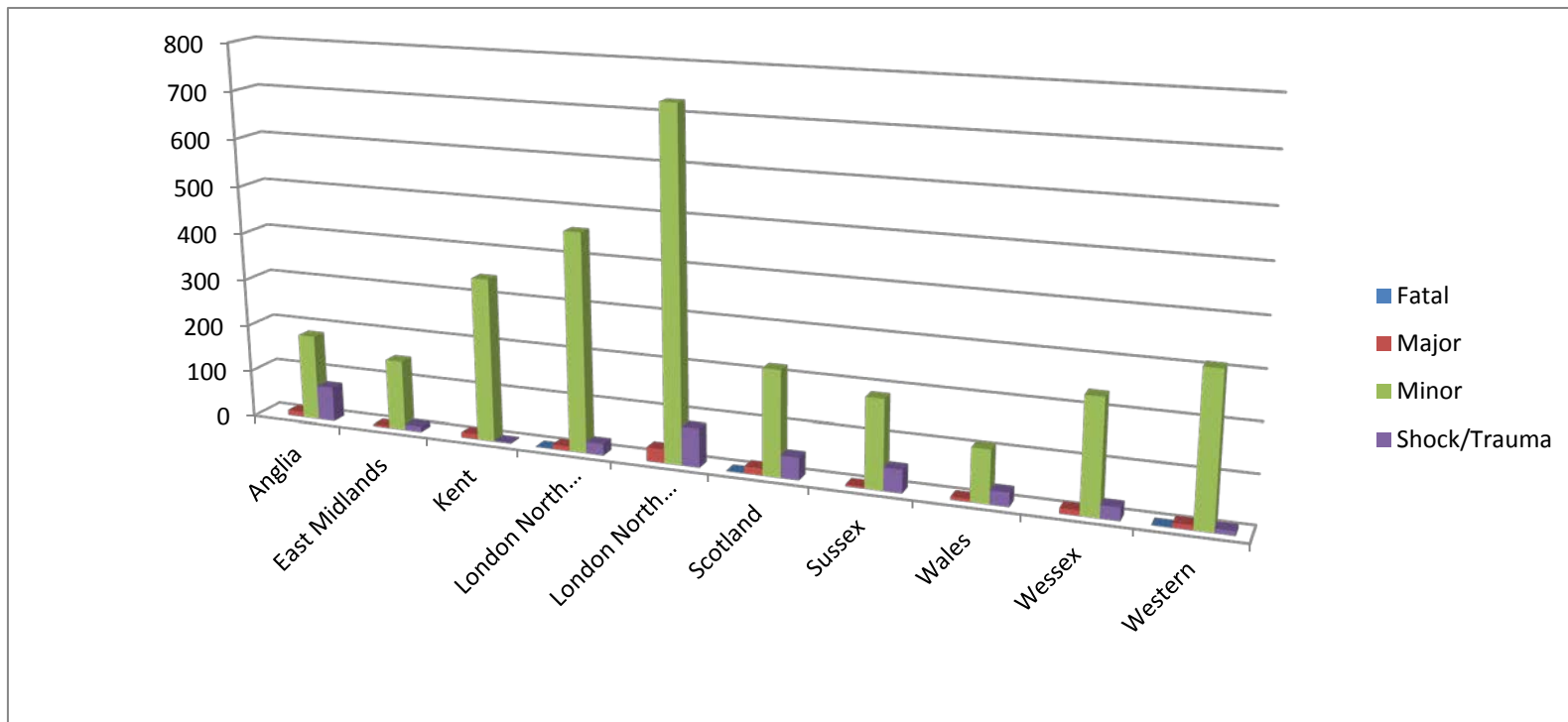
2013 Staff Accident Analysis

Sum of injdeg2	INJURY DEGREE					
OP_ROUTE	Fatal	Major	Minor	Shock/Trauma	Grand Total	
Anglia			7	242	58	307
East Midlands			3	198	28	229
Kent			9	347	11	367
London North Eastern		2	17	428	65	512
London North West			33	695	155	883
Scotland			13	251	38	302
Sussex			8	182	31	221
Wales			4	174	36	214
Wessex			12	284	43	339
Western			18	337	20	375
Grand Total		2	124	3138	485	3749



2014 Staff Accident Analysis

Count of INJURY DEGREE	INJURY DEGREE					
OP_ROUTE	Fatal	Major	Minor	Shock/Trauma	Grand Total	
Anglia			11	182	73	266
East Midlands			4	149	12	165
Kent			11	344	2	357
London North Eastern		1	10	459	24	494
London North West			29	728	81	838
Scotland		1	15	220	47	283
Sussex			4	185	48	237
Wales			6	110	29	145
Wessex			11	236	27	274
Western		1	10	312	9	332
Grand Total		3	111	2925	352	3391



Appendix F Cost Analysis

[illegible]

[illegible]

		Capex				25 year Opex			Totex
Class 3.0 OTP / OTM Access Point (Small)	Description	Unit	Amount	Unit rate	Total Capex	Number of repairs in term	Cost of each repair	Total Opex	Capex + Opex
X	Planning	sum	1	£ 5,279.20	£ 5,279.20				£ 5,279.20
X	Site Management	wk	1	£ 1,344.83	£ 1,344.83				£ 1,344.83
X	Site visits	nr	1	£ 608.31	£ 608.31				£ 608.31
X	Survey & Design	sum	1	£ 2,098.60	£ 2,098.60				£ 2,098.60
X	Topographical Survey	Sum	1	£ 1,513.84	£ 1,513.84				£ 1,513.84
X	Site Mobilise/De-Mobilise	Sum	1	£ 6,892.74	£ 6,892.74				£ 6,892.74
X	Vegetation Removal	m2	340	£ 2.54	£ 864.79				£ 864.79
X	Remove debris and re-instate walkways	m2		£ 4.88	£ -				£ -
X	Access Track Upgrade	m2	20	£ 38.03	£ 760.58				£ 760.58
X	Armco Barrier	m	48	£ 274.15	£ 13,159.43				£ 13,159.43
X	Concrete Apron Installation	m3	12	£ 1,535.07	£ 18,420.89				£ 18,420.89
X	Strail/Holdfast Unit installation	sum	1	£ 11,739.07	£ 11,739.07				£ 11,739.07
X	Remove Apron & Existing Strail	sum		£ 10,474.07	£ -				£ -
X	Palisade Fence Installation	m	28	£ 254.66	£ 7,130.40				£ 7,130.40
X	Palisade Pedestrian Gate	nr		£ 1,212.00	£ -				£ -
X	Palisade Vehicle gate	nr	1	£ 2,032.00	£ 2,032.00				£ 2,032.00
X	Walkway Edges - Concrete	nr		£ 65.00	£ -				£ -
X	Walkway Edges - FRP	nr		£ 38.00	£ -				£ -
X	Walkway Fill - type 1 natural aggregate	m2		£ 160.00	£ -				£ -
X	Handrail - GRP	nr		£ 529.00	£ -				£ -
X	Handrail - Steel	nr		£ 597.00	£ -				£ -
X	Steps - GRP	m		£ 1,010.00	£ -				£ -
X	Steps - Stanton Bonna – Pre Cast Concrete	m		£ 967.00	£ -				£ -
X	Roadway – MOT Type 1(Stone)	m3	20	£ 99.00	£ 1,980.00				£ 1,980.00
	Permanent Lighting (RRAP / Roadway / compound)	nr		£ 1,500.00	£ -				£ -
X	Temporary lighting	nr		£ 2,000.00	£ -				£ -
X	Location and Safety Information Board	nr	1	£ 1,000.00	£ 1,000.00				£ 1,000.00
X	Removable Bollards -Steel	nr		£ 180.00	£ -				£ -
X	Drainage (surfacing dependant)	m2			£ -				£ -
	Welfare facilities - including sheltered briefing area, and amenity block (permanent)	nr		£ 25,000.00	£ -				£ -
X	Welfare facilities - including sheltered briefing area and amenity block (temporary)	nr		£ 25,000.00	£ -				£ -
X	Material storage (S&C) - 20ft x 8ft container	nr		£ 2,000.00	£ -				£ -
X	Demarcation of vehicle / pedestrian routes	m2	30	£ 7.00	£ 210.00				£ 210.00
	Service connections - Electricity / water	sum			£ -				£ -
X	Enhanced Security - Anti trespass – Level 1	sum			£ -				£ -
X	Enhanced Security - Enhanced – Level 2	sum			£ -				£ -
	Enhanced Security - High – Level 3	sum			£ -				£ -
								Total Cost -	£ 75,034.67

[illegible]

		Capex				25 year Opex			Totex
Class 5.0 OTP / OTM Access Point (Large)	Description	Unit	Amount	Unit rate	Total Capex	Number of repairs in term	Cost of each repair	Total Opex	Capex + Opex
x	Planning	sum	1	£ 5,279.20	£ 5,279.20				£ 5,279.20
x	Site Management	wk	1	£ 1,344.83	£ 1,344.83				£ 1,344.83
x	Site visits	nr	4	£ 608.31	£ 2,433.24				£ 2,433.24
x	Survey & Design	sum	1	£ 2,098.60	£ 2,098.60				£ 2,098.60
x	Topographical Survey	Sum	1	£ 1,513.84	£ 1,513.84				£ 1,513.84
x	Site Mobilise/De-Mobilise	Sum	1	£ 6,892.74	£ 6,892.74				£ 6,892.74
x	Vegetation Removal	m2	1800	£ 2.54	£ 4,578.32				£ 4,578.32
x	Remove debris and re-instate walkways	m2		£ 4.88	£ -				£ -
x	Access Track Upgrade	m2	180	£ 38.03	£ 6,845.20				£ 6,845.20
x	Armco Barrier	m	120	£ 274.15	£ 32,898.58				£ 32,898.58
x	Concrete Apron Installation	m3	12	£ 1,535.07	£ 18,420.89				£ 18,420.89
x	Strail/Holdfast Unit installation	sum	1	£ 11,739.07	£ 11,739.07				£ 11,739.07
x	Remove Apron & Existing Strail	sum		£ 10,474.07	£ -				£ -
x	Palisade Fence Installation	m	238	£ 254.66	£ 60,608.37				£ 60,608.37
x	Palisade Pedestrian Gate	nr		£ 1,212.00	£ -				£ -
x	Palisade Vehicle gate	nr	2	£ 2,032.00	£ 4,064.00				£ 4,064.00
x	Walkway Edges - Concrete	nr		£ 65.00	£ -				£ -
x	Walkway Edges - FRP	nr		£ 38.00	£ -				£ -
x	Walkway Fill - type 1 natural aggregate	m2		£ 160.00	£ -				£ -
x	Handrail - GRP	nr		£ 529.00	£ -				£ -
x	Handrail - Steel	nr		£ 597.00	£ -				£ -
x	Steps - GRP	m		£ 1,010.00	£ -				£ -
x	Steps - Stanton Bonna – Pre Cast Concrete	m		£ 967.00	£ -				£ -
x	Roadway – MOT Type 1(Stone)	m3	180	£ 99.00	£ 17,820.00				£ 17,820.00
x	Permanent Lighting (RRAP / Roadway / compound)	nr	14	£ 1,500.00	£ 21,000.00				£ 21,000.00
	Temporary lighting	nr		£ 2,000.00	£ -				£ -
x	Location and Safety Information Board	nr	1	£ 1,000.00	£ 1,000.00				£ 1,000.00
x	Removable Bollards -Steel	nr		£ 180.00	£ -				£ -
x	Drainage (surfacing dependant)	m2			£ -				£ -
x	Welfare facilities - including sheltered briefing area, and amenity block (permanent)	nr	1	£ 25,000.00	£ 25,000.00				£ 25,000.00
x	Welfare facilities - including sheltered briefing area and amenity block (temporary)	nr		£ 25,000.00	£ -				£ -
x	Material storage (S&C) - 20ft x 8ft container	nr	2	£ 2,000.00	£ 4,000.00				£ 4,000.00
x	Demarcation of vehicle / pedestrian routes	m2	1800	£ 7.00	£ 12,600.00				£ 12,600.00
x	Service connections - Electricity / water	sum			£ -				£ -
x	Enhanced Security - Anti trespass – Level 1	sum			£ -				£ -
x	Enhanced Security - Enhanced – Level 2	sum			£ -				£ -
x	Enhanced Security - High – Level 3	sum			£ -				£ -
								Total Cost -	£ 240,136.87

Appendix G Benefit Matrix

Assessment	Score	
Sub - categories	Essential Benefit	1
	Optional Benefit	2
	No Benefit	3

[illegible]

[illegible]

[illegible]

Element	Class 4.0	Sustainability	Safety	Environmental	Ecological	Cultural	Behavioural	Competence	Training	Briefing and Communication	Supervision	Planning
	Super RRAP / RRV Access	is the endurance of systems and processes	the condition of being protected from or unlikely to cause danger, risk, or injury	relating to the natural world and the impact of human activity on its condition	relating to or concerned with the relation of living organisms to one another and to their physical surroundings.	relating to the ideas, customs, and social behaviour of a society	involving, relating to, or emphasizing behaviour	the ability to do something successfully or efficiently	the action of teaching a person a particular skill or type of behaviour	the imparting or exchanging of information by speaking, writing, or using some other medium.	the action of supervising someone or something	the process of making plans for something
Pedestrian Access	✓	1	1	3	3	2	1	1	3	2	2	3
Walkway	✓	1	1	3	3	2	1	1	3	2	2	3
Handrail: Steel / GRP/FRP	✓	1	1	3	3	2	1	2	3	3	3	3
Steps	✓	1	1	3	3	2	1	1	3	2	2	3
Access Gates: Pedestrian	✓	1	1	3	3	2	1	1	3	2	2	3
Access Gates: Vehicle / RRV	✓	1	1	3	3	2	1	1	3	2	2	3
Roadway – MOT Type 1(Stone)	✓	1	1	3	3	2	2	1	3	2	2	3
Roadway – Asphalt surfacing c/w kerbing	✓	1	1	2	2	2	2	1	2	2	2	3
Signage – QR code / Access point information	✓	1	1	3	1	1	1	1	1	1	2	1
Fencing – New works / upgrades	✓	1	1	3	3	2	1	1	3	2	2	2
Permanent Lighting (RRAP / Roadway / compound)	✓	1	1	3	3	2	1	1	2	1	1	1
Temporary lighting	✓	1	1	3	3	2	1	1	2	1	1	1
Solar powered lighting (to be considered)	✓	1	1	1	1	2	1	1	2	1	1	1
Car / Van parking / off road parking	✓	1	1	3	3	2	2	2	2	1	2	2
HGV turning area	✓	1	1	3	3	2	2	1	3	2	2	3
Armco barrier - Vehicle protection	✓	1	1	3	3	2	2	2	3	3	3	3
Removable Bollards (Steel, recyclable material)	✓	1	1	1	1	3	3	2	3	3	3	3
Drainage (surfacing dependant)	✓	1	1	2	2	2	3	3	3	3	3	3
Welfare facilities (permanent)	x											
Welfare facilities (temporary)	✓	1	1	3	2	1	1	2	3	1	2	1
Sheltered briefing area	✓	1	1	3	1	1	1	2	1	1	1	1
Material storage (S&C)	✓	1	1	1	1	1	1	2	2	2	2	2
Concrete apron for RRV vehicles	✓	1	1	3	3	2	2	2	3	2	3	3
Demarcation of vehicle / pedestrian routes	✓	1	1	3	1	2	1	2	1	1	1	1
Amenity Block (dry room, PPE storage)	✓	1	1	2	2	1	1	1	2	1	1	1
Service connections - Electricity / water	✓	1	1	3	2	1	1	1	1	1	1	1
Enhanced Security - Anti trespass – Level 1	✓	1	1	3	3	1	1	1	2	2	1	1
Enhanced Security - Enhanced – Level 2	✓	1	1	3	3	1	1	1	2	2	1	1
Enhanced Security - High – Level 3	✓	1	1	3	3	1	1	1	2	2	1	1

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