Engineering Justification Paper

Fleet - EAP

Final Version

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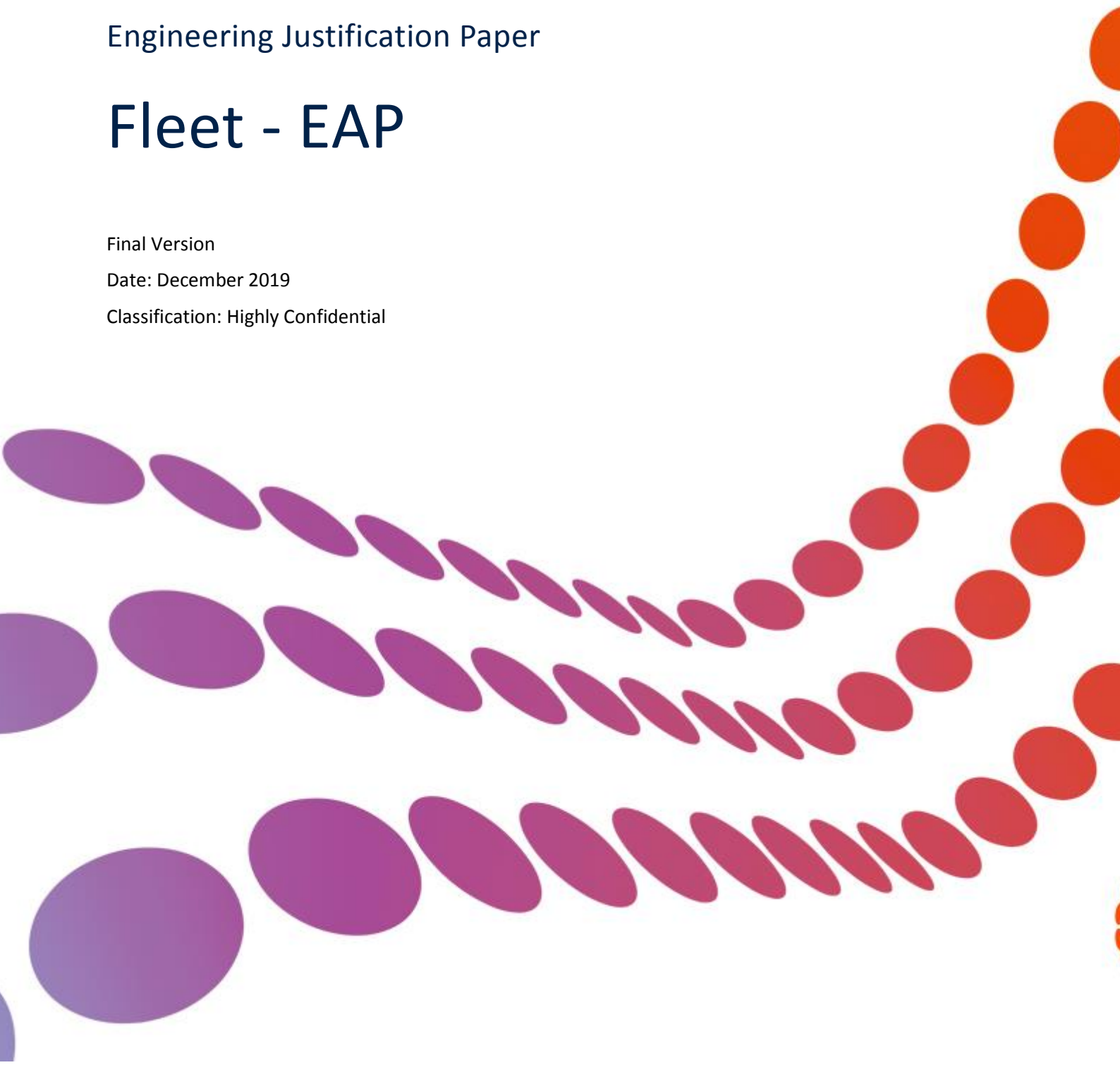

1. Table of Contents

2 Introduction

SGN operates a large fleet of commercial vehicles to support its operation. The size and makeup of the operational fleet is driven by either the necessity to be agile and responsive to emergency situations for both first response and subsequent network repairs, or as a means to transport operatives and equipment needed to carry out scheduled maintenance, site support and upgrade works.

The vehicles and operatives are often required to be on site for an unknown duration, the vehicle being pivotal in responding promptly to emergencies and is often a tool to facilitate repairs on our network and support the SGN operatives on site. The core operational vehicle types in the light commercial fleet are used by repair, maintenance and First Call Operatives, supported by a mixture of other vehicles types which include small vans, 4x4s, flat beds and tippers, as well as more specialist HGV vehicles such as the syphon tankers, Core and Vac, etc. Operational teams will be on standby and are required to respond to emergency situations, therefore it is critical that they always have access to a vehicle.

SGN recognises that our fleet is the largest controllable aspect of our business carbon footprint. With the UK governments targets for the UK to be Net Zero by 2050 and the Scottish Government setting the target for Net Zero by 2045, we have an opportunity with our fleet to make considerable reductions in our business carbon footprint and this paper will document our plan accordingly.

2.1 General Background

The fleet takes a standard manufacturers vehicle to an agreed size and specification, a bespoke internal and external fitout is undertaken to meet the specialist operational requirements for the role that the vehicle will be deployed in. The fitout varies from simple livery, beacons and chapter 8 markings, to full racking, power and air systems. The vehicles are designed to be as far as possible self-contained, transporting the team and equipment to the location and support them whilst they carry out their work safely.

2.2 Site Specific Background

The number and types of vehicles at each site will be largely dependent on the operational and geographical requirements of the depot, the vehicles are retained by operational teams to help avoid additional travel to and from depots, the mileage and journeys covered will again depend on the operational requirements and geographical location.

3 Equipment Summary

Figure 1: Example of our current Fleet

The makeup of our commercial fleet is shown in the table below, the fleet is split approximately 39% Scotland and 61% Southern.

Table 1: Fleet Make up

Vehicle Type	No of Vehicles	Average Emissions g/km	Specification
4x4 (RCA, Plant Protection, Team Managers)	42	215	Standard Vehicle – Minor modification
Medium van (FCO)	494	212	Standard Vehicle - Modification, racking, storage and safety equipment
Large van (Repex, Connections, Maintenance & Repair team)	950	225	Significantly Modified vehicle to include racking, PTO, safety equipment
Small van (RCA, Plant Protection, Team Managers)	153	185	Standard Vehicle – Minor modification
Support – (Dropside, tipper, stores delivery vans)	225	225	Standard Vehicle – Minor modification
HGV	42	Not given	Specialist vehicle
Hired	207	unknown	Standard vehicle
Total	**2113**		

The 4x4s are used by RCA's, Plant Protection teams and Team Managers. They are a standard pickup truck with a truckman body and storage, in SGN livery, with additional safety equipment.

Medium vans are 2.9t GVW and are primarily used by First Call Operatives (FCO). They are typically a short wheelbase van with a high roof (for example a Ford Transit Connect). Internally they are racked for the safe storage of tools and equipment and externally they have SGN livery, chapter 8 compliant safety markings and beacons.

Large vans are 3.5t GVW, make up nearly 50% of the fleet and are used by maintenance, repair, replacement and connection teams. They are typically short or medium wheelbase vans with a high roof (typically Mercedes Sprinter) and then modified to meet the operational requirement, such as racking and storage for parts and equipment or a power take off system for air and electric to operate required tooling and equipment. The van is in SGN livery with chapter 8 markings and beacons. A rear step and towing eye are also part of the standard equipment.

Small vans are used by RCAs, Plant Protection and Team Managers. They are a standard small van (typically Ford Fiesta) in SGN livery with minor modifications.

Support vehicles are 3.5t GVW and include drop side with tail lift, tippers and box vans. They are typically used to deliver parts and equipment to operatives whilst they are on a job. They are livered and have chapter 8 markings and lights but otherwise are a standard vehicle type.

HGVs operate at various different weights and include box vans and syphon tankers being reasonably standard vehicles, or the incident support and Core & Vac vehicles which are custom build to SGN's requirements. All are liveried and have chapter 8 safety markings and beacons.

4 Problem Statement

Why are we doing this work and what happens if we do nothing?

Fleet use during our daily operations is a significant part of our business carbon footprint, both commercial and company cars accounted for an average 77% of our Scope 1+2 Business Carbon Footprint during GD1. We must adopt plans during GD2 that will allow us to react to changes in the automotive industry and increasing pressures to reduce our carbon footprint. Accordingly, SGNs fleet will be very different when we end GD2 in 2026, than now – but how different is dependent on a lot of factors which are out of our control. Two such factors would include the number of and location of electric vehicle charging posts, and secondly the range of alternative fuelled vehicles and their availability. A lot of the technology fuelling this change is still in development as of 2019 but very likely to come into fruition during GD2.

Scope 1 – All Direct Emissions from the activities of an organisation or under their control. Including fuel combustion on site such as gas boilers, fleet vehicles and air-conditioning leaks.

Scope 2 – Indirect Emissions from electricity purchased and used by the organisation. Emissions are created during the production of the energy and eventually used by the organisation.

It is apparent as we end GD1 that Electric Vehicles (EVs) and alternative fuels are becoming more mainstream. There are new technologies and vehicles being released every month and as we move towards GD2 it should be expected that our fleet will be very different after a further 8 years of technological innovation and development (2019 to 2026). We need to invest in our fleet to reduce the carbon emissions. This is likely to be a combined strategy looking at alternative fuel vehicles and lowering the CO_2 cap on company cars.

SGN is very mindful of the environmental impact on operating a large fleet of vehicles and plant equipment, and whilst the short term (2-3yr) opportunities to significantly affect that environmental impact are limited, with the anticipated advances in vehicle technology, data capture and refuelling infrastructure it is believed there is an opportunity in the mid (4-10yr) and more so for the longer term (10yr+) to significantly reduce the emissions generated by SGN's Fleet.

If we do nothing, then our Scope 1 and Scope 2 carbon footprint will not reduce in size. As per the requirements of achieving the UK and Scottish Governments Net Zero target by 2050 and 2045 respectively, we must make reductions across many areas of our Business Carbon Footprint, including fleet.

What is the outcome SGN are looking to achieve?

The project maintains and refreshes the fleet to an acceptable level in order to support operatives in the delivery of services to customers and in the mid (4-10yr) and more so for the longer term (10yr+) to significantly reduce the emissions generated by our vehicle fleet.

What are the key milestone dates for project delivery?

By the start of GD2 we will have understood the opportunities for charging better and will have already installed a number of additional charging posts. The key milestones will be a half yearly review of the available vehicles in the market and comparison against what type and number of vehicles we have in our fleet. For example, it is very likely that comparable medium and large vans from alternative fuels including EV will be available in 2022 and 2023, which is half-way through GD2. We would like to therefore re-assess the market in 2021 in preparation for this change. By 2024 and 2025 we should start to see the vehicles coming into the fleet such that by 2026 we should be able to demonstrate change happening which will then continue through into GD3 – most likely at a more accelerated rate as there will be greater confidence and certainty of direction from the automotive industry. Beyond GD2 we will continue to asses technology and availability of suitable ULEVs and stretch our target to run a fully decarbonised fleet if possible.

How will we understand if the spend has been successful?

The key milestone dates for the project are annually on delivery of the new vehicles into the fleet. The understanding on the success of the project would be measured in maintaining vehicle availability within the budgeted maintenance cost and an annual reduction of our fleet vehicle emissions in line with our environmental ambition to have 50% of the vehicles replaced during GD2 to be ULEV.

Out targets are in low ambition to have 50% of new vehicles if possible, switched to alternative fuel. That rises to a 75% for medium ambition, and 100% of new vehicles under high ambition.

4.2 Narrative Real-Life Example of Problem

We have been exploring the opportunity to use both alternative fuel and EV's going into GD2. This supports a change to the automotive industry which has only just started but will continue in proliferation through GD2 and in all future price control periods.

There are limitations on our ability to rollout these new vehicles across our fleet. The first limitation is the actual number of, and type of, suitable alternatives. For example, we could replace our small Fiesta van with an EV of 200+ miles range. We could not however replace our current 4x4 with any alternative because of critical operational requirement and current suitable vehicle availability.

Aside from the vehicle technology, there is a parallel requirement for there being the infrastructure available to re-fuel or refill alternative vehicles. For example, if we issue a mobile worker with an EV then they should be able to charge this vehicle at or close to home, but that is dependent on local availability or whether they have an off-street drive where their own charger could be installed. Additionally, if a worker lives in a terraced property with an un-named parking space then we could not currently with confidence provide this individual with an EV.

The following are provided as an illustration to the Infrastructural and Operational aspects which need to be considered when looking at an alternative vehicle.

- Is the role depot based? – Can they charge the vehicle in the depot?
- Is the role home based? – Can they charge the vehicle at home?
- How many times would that vehicle visit the Depot on an average day?
- What is the vehicles average daily mileage?
- What would be the maximum likely daily mileage?
- What is the payload requirement for that vehicle?

- Does this vehicle require specialist equipment or adaptations?
- Is this vehicle required for a 24/7 immediate purposes?

4.3 Spend Boundaries

The project would include the additional funding required in order to support SGNs plans to reduce the carbon footprint of its fleet. As detailed above, there are levels of ambition stated which will require different amounts of funding.

Table 2: Capex Requirements options 1. to 3.

Option 1. 100% EV Replacement in GD2						Total
Year	2022	2023	2024	2025	2026	
EV Vehicle Investment (£m)	3.11	3.11	3.11	3.11	3.11	15.53
Accelerated Replacement 8yr to 6yr (£m)	2.69	2.75	0.76	3.66	2.19	12.06
Infrastructure Investment (£m)	0.78	0.78	0.78	0.78	0.78	3.88
Option 2. 75% EV Replacement in GD2						Total
Year	2022	2023	2024	2025	2026	
EV Vehicle Investment (£m)	2.69	2.75	0.76	3.66	2.19	11.65
Accelerated Replacement 8yr to 6yr (£m)	2.18	2.18	2.18	2.18	2.18	12.06
Infrastructure Investment (£m)	0.58	0.58	0.58	0.58	0.58	2.91
Option 3. 50% EV Replacement in GD2						Total
Year	2022	2023	2024	2025	2026	
EV Vehicle Investment (£m)	1.54	1.54	1.53	1.52	1.51	7.63
Accelerated Replacement 8yr to 6yr (£m)	2.69	2.75	0.76	3.66	2.19	12.06
Infrastructure Investment (£m)	0.39	0.38	0.38	0.38	0.38	1.91

The project includes the vehicle and associated post vehicle manufacturer built interior or exterior equipment such as racking, livery, rear step, chapter 8 markings and lights, power take off and other vehicle fittings. It does not cover parts, tooling or operative equipment such as PPE. The additional capital cost of EV's is included in the project as well as EV charging points and the associated power infrastructure to support them. The possible operational impact on vehicle charging requirements has not been included.

5 Probability of Failure

What is feasible during GD2 is heavily dependent on external developments like the number of, and availability of, public charging infrastructure, as well as the new vehicles being available in the market. We will scope out plans for our changing fleet, ascertain if certain drivers can or cannot charge at their homes and invest in more charging posts at depots to support the transition to alternative fuel. The ultimate adoption and transition to EVs and alternative fuels is however driven by external factors.

Table 3: Challenges to achieving our ambition

Small Vans and 4x4	• Suitable EV is available, realistic range currently 150 miles. • Realistic opportunity for EV when operating in major cities and towns • Home or local charging availability could restrict effectiveness • Occasional high mileage requirement could limit wider introduction • Range and adverse weather performance requirement limit the inclusion of EV 4x4
Medium Vans	• Vehicle range 200 mile+ • Readily available fast charging infrastructure at the depots • Readily available backup teams and vehicles.
Large Vans	• Vehicle range 200 mile+ • Payload after fit-out 1,000kgs • Readily available fast charging infrastructure • No reliance on van to operate tooling and equipment • Develop alternate methods to power plant and equipment • Readily available back-up teams and vehicles
Support Vehicles	• Normally speciality or bespoke vehicles • Cover high mileage • Technology for bespoke applications lags off-the-shelf solutions so there is no visibility yet of a solution • CNG could represent a viable alternative fuel for an HGV but will need further investigation

Logistics of charging

There are examples where our vehicles must stay out on the patch for extended periods of time, or where these vehicles run auxiliary equipment. Additionally, there could be a scenario where a worker and vehicle need to travel from one place to another without going back through the depot and hence may not have the opportunity to charge the vehicle. Finally, there may not be enough time available to charge the vehicles in-between jobs. For example, if a worker returned their vehicle to the depot and started charging, then they couldn't be constrained by having to wait 4-5hrs for their vehicle to charge – especially true if it was an emergency which we must attend within 2hrs of being reported.

Infrastructure

We need the infrastructure to be available to support our EV Fleet, and there are challenges with this. Not every employee will live in a home with off-street parking and the space to install a home charger. Despite these challenges we will have to support more charging points being rolled out because we cannot transition to adopt EVs without the charging network being available both in public spaces, at our homes and in our offices and depots.

Geography of use

Adopting EVs makes immediate sense if you are in a city centre location where you may have a lower daily mileage, plus there are additional restrictions due to low emissions zones in city centres

promoting the use of EVs and low emission vehicles. This would be where we can make the most immediate and quickest change. Where we face a challenge is that in rural Scotland there may be many miles between towns and the potential for charging, so a vehicle may be on the patch for extended periods as-well as travelling many miles. As more vehicles enter the market and their range continues to increase this will support the transition to low-carbon vehicles for our Scottish part of the business too.

Lack of suitable EV vehicles

As of 2019 we are still at an early start of a change to EVs. There has been a marked increase in the number of EVs vehicles coming to market, and with rising fuel costs, noticeable climate change and more clarity of the health implications from diesel there is accelerating uptake for EVs. All motor manufacturers of every type of vehicle are hurriedly developing electric vehicles, and especially for the commercial fleet market, these vehicles will be available from the early period of GD2 onwards. In essence our investment and strategy are based on vehicles which are not currently available in the market.

Uncertainty in the technology and development through GD2

GD2 lasts until 2025/2026 so it is very likely there will continue to be rapid technological advances to this point. There are various emerging technologies which could change still how fleet may operate during GD2. For example, instead of lithium Ion batteries, there are graphene batteries which store more power and charge quicker – so the argument of “range anxiety” could disappear during GD2. There are other advances as-well with other alternative fuels such as CNG or Hydrogen which could also develop during GD2 which may again change the type of vehicle chosen.

Operational requirements

SGN operate a very broad number of different types of vehicles in our fleet, not just small and large vans. We have several specialist vehicles for a number of operational roles which are very likely to be amongst the last types of vehicles which will switch over to alternative fuels. Our opportunity with EVs will be limited in the short term to small and medium vans which can charge at home or at depots. As we move towards GD3 the industry will have moved on and there will be more certainty on battery technology, ranges and alternative fuels.

It should be noted that because of the critical nature of many of SGN’s vehicles in carrying out services or responding to emergency situations, a significant change such as alternate fuelled vehicles will require to be fully evaluated and tested prior to mainstream introduction.

Table 4: Vehicle repairs lost time

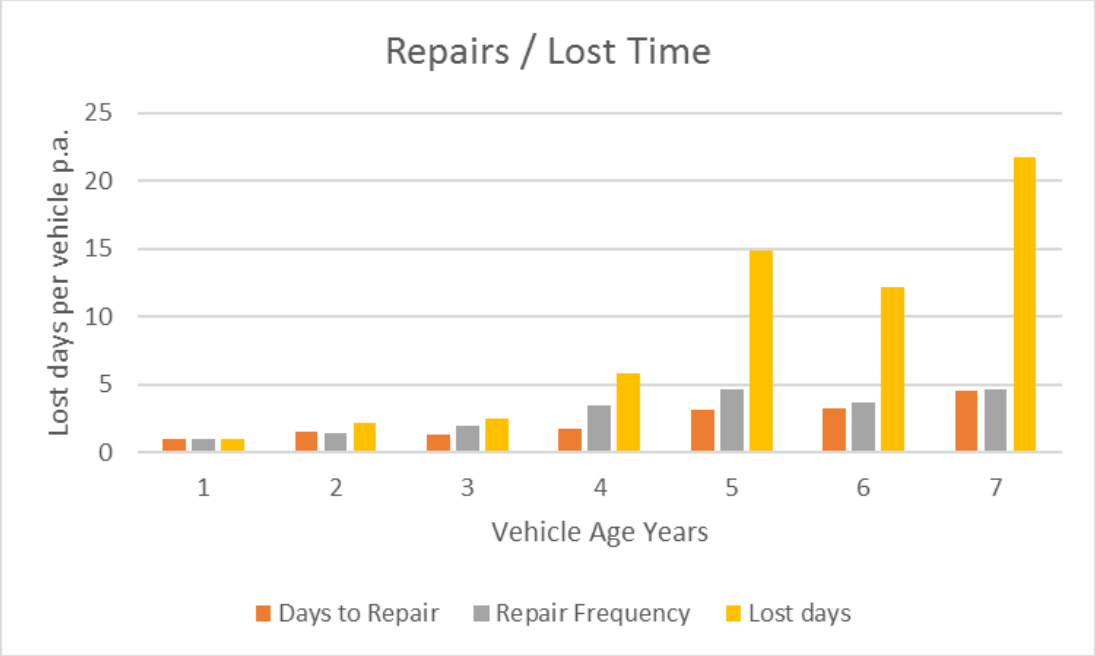

Table 4 shows the trend from available historic maintenance data that as a vehicle ages it requires repair more frequently and that when being repaired the repairs take longer. Usable data for our fleet is not available from year 8 onwards but assuming the trend continues the likely impact of vehicle breakdowns and lost time would probably seriously affect our ability to meet operational requirements.

5.2 Probability of Failure Data Assurance

Whilst historic data may not necessarily predict future trends, particularly with the move to alternate fuels and changes to vehicle manufacturing techniques and materials that are seeing extended service intervals would indicate more confidence in the reliability of new vehicles, this is countered by the requirement to make them cleaner, add additional features and the interdependency on a number of the new features, giving more opportunity for areas of the vehicle to fail.

The historic data is the main source of information and from the analysis shown in table 4. Vehicle Repairs lost time – which has been produced using available SGN historic data supplied by our fleet management company, the data whilst not complete clearly demonstrates as a vehicle ages, on average it breaks down more often, and takes longer to repair, which is general accepted assumption in the automotive industry, with van manufacturers only offering warranty for the first 3 to 5 years.

If we continue to operate diesel vehicles on an 8yr replacement cycle, we will see a year on year reduction of 1.3% in CO2 emissions from our commercial fleet, this will fail to meet our CO2 reduction target. By moving to a 6yr replacement cycle and 50% of replacements EV's that CO2 reduction increases to 9.1% year on year, meeting our GD2 CO2 reduction ambition.

6 Consequence of Failure

Essentially the consequence of failure (if failure is measured as not investing and not changing the fleet) is that we retain high fuel costs, similar levels and spend on maintenance and not achieving any tangible drop in our carbon footprint. By not replacing the fleet with newer and cleaner vehicles including EV's will result in us not meeting our target reduction in CO2 emissions and have a continuous environmental impact. The additional reliability issues and frequency of repair of older vehicles could affect and delay our ability to attend emergency repairs or maintenance site visits that could affect customers supply and safety.

As previously stated earlier in the Fleet EJP, we operate a large fleet of commercial vehicles to support its operation. The size and makeup of the operational fleet is driven by either the necessity to be agile and responsive to emergency situations for both repair and leaks, or as a means to transport operatives and equipment to carry out scheduled maintenance or upgrade works. The vehicles and operatives are often required to be on site for an unknown duration, the vehicle being pivotal in responding promptly to emergencies and is often a support vehicle to facilitate the repair and support the SGN operative once on site. The core vehicle types in the light commercial fleet are repair, maintenance and (FCO) emergency, supported by a mixture of other vehicles types which include small vans, 4x4s, flat beds and tippers, as well as more specialist HGV vehicles such as the syphon tankers, Core and Vac, etc. Operational teams will be on standby and are required to respond to emergency situations, therefore it is critical that they have access to a vehicle at all times. The consequence of vehicle failure could be delayed response in attending an emergency situation, or plant and equipment delays facilitating repairs, or delays in completing scheduled maintenance work. Delay in repairing any gas leak has an environmental, safety and customer impact, the scale of which is dependent on the size of the leak and length of the delay resulting for a vehicle breakdown. Vehicle breakdowns can also have an additional impact on the safety of our operatives, particularly in poor weather or when broken down in a vulnerable position, the requirement to deploy breakdown and recovery vehicles along with an additional SGN team to attend the work will also have an environmental impact.

7 Options Considered

The option to do nothing and continue to operate the existing vehicle fleet on an 8 – year replacement cycle was considered, but it was felt following the feedback from stakeholder engagement that a much higher ambition was required in reducing the environmental impact of our fleet. If we look in detail as to the options for investment, we could include for illustrative purposes the 8-year replacement cycle which would not deliver the level on ambition required and has not been discussed as an option in the Fleet EJP EAP as not a viable option but can be found in the Fleet EJP. There is the detail below for the low, medium and high levels of ambition, which is a cost in addition to the 8-year replacement cycle in the fleet EJP. For reference a summary of the 8-year replacement cycles environmental impact is as below.

Table 5: Baseline do nothing 8-year replacement program

Baseline do Nothing standard 8 Year replacement cycle						GD2
Year	2022	2023	2024	2025	2026	
EV Vehicle Investment (£k)	0	0	0	0	0	0
CO2 Reduction %	-1.3%	-2.6%	-3.8%	-5.1%	-6.4%	6.4%
Fuel Cost Reduction (£k)	0	-77	-154	-231	-308	-769
Maintenance Reduction (£k)	0	0	0	0	0	
Nett Positions (£k)	0	-77	-154	-231	-308	-769

We have looked at the current types of technology which are available 'off-the-shelf'. As of late 2019, there are no viable alternatives which could see our fleet transition completely to alternative fuels. This means that our most stretching target could not be fulfilled with today's technology. Our plans whether low, medium or high in ambition all rest on technology which is not yet available.

The types of technology which are coming to market now do offer an alternative to traditional fuels such as diesel, but there are limitations to their range and therefore viability as a replacement. For example, in some circumstances a large van could be in-situ for several hours whilst workers use the van for powered equipment, to power other equipment like task lighting or simply for the heaters as a place to keep dry and warm. The van therefore becomes a vital piece of equipment in terms of the employee's welfare and to get the job done. The current best in class in performance of an EV van would be approx. 100miles which would simply not be enough power for extended periods. Conversely however as we go through GD2 there very well may be the technology available which could extend battery ranges far beyond the current boundaries.

An example of this would be the different developments currently underway with only one aspect, battery technology. Currently the biggest limiting factor to EV is the potential range of the vehicles. As range increases of new EVs there will be a level at which the general population will accept. For example, the stress of finding an on-street charger is made less pressing if your range is 600 miles on a full charge compared to 60 miles currently for a vehicle like a 1st gen Nissan Leaf. The same would be true of our commercial fleet. We could not suggest that a vehicle would be viable with anything less than 100 miles range, and especially then if that involves multiple charges throughout the day.

Much of this paper has focused on the requirements to support what is seen as being the dominant electric vehicle future in a post combustion vehicle industry. There are however other technologies which we will continue to investigate for its viability including CNG and LPG. SGN is also keen on hydrogen fuelled vehicles as we may see our network utilised in due course to carry hydrogen, so having a number of vehicles using that as a fuel source would be beneficial and convenient.

Table 6: EV opportunity analysis

Vehicle Type	No of Vehicles	Specification	Is there an alternative now?	Expected vehicle availability
4x4 (RCA, Plant Protection, Team Managers)	42	Standard Vehicle – Minor modification	**No – Operational restraints**	2023
Medium Van (FCO)	494	Standard Vehicle - modification, Racking, Storage and safety equipment	**Yes – however on call requirement restrictions apply**	2020
Large Van (Repex & Connections, Maintenance & Repair team)	950	Significantly modified vehicle to include racking, PTO, safety equipment	**No – Limited by range, towing and tooling**	Unknown
Small Van (RCA, Plant Protection, Team Managers)	153	Standard vehicle – Minor modification	**Yes – however on call requirement restrictions apply**	2020
Support – (Dropside, tipper, stores delivery vans)	474	Standard vehicle – Minor modification	**Limited opportunity including specialist vehicles**	Unknown

From this table it is clear that we have an opportunity at present to replace some of our smaller fleet vehicles with the potential for alternative fuel and EVs. From stakeholder feedback and to meet our level of ambition to accelerate the replacement of older vehicles and introduce EV's to a level that meets our ambition and stakeholder expectation the preferred option is option 3.

We have summarised our three levels of ambition as the following:

7.1 Option 1. 100% of vehicle replaced during GD2 to be EV's

Table 7: Option 1. 100% EV replacement program

Option 1. 100% EV Replacement in GD2						Total
Year	2022	2023	2024	2025	2026	
EV Vehicle Investment (£m)	3.11	3.11	3.11	3.11	3.11	15.53
Accelerated Replacement 8yr to 6yr (£m)	2.69	2.75	0.76	3.66	2.19	12.06
Infrastructure Investment (£m)	0.78	0.78	0.78	0.78	0.78	3.88
CO2 Reduction %	-19.14%	-35.78%	-52.42%	-69.06%	-85.69%	-85.69%
Fuel Cost Reduction (£m) Nett	-0.65	-1.17	-1.69	-2.21	-2.72	-8.45
Maintenance Reduction (£m)	-0.05	-0.09	-0.14	-0.19	-0.23	-0.70
Nett Positions (£m)	5.87	5.37	2.81	5.15	3.12	22.32

This option is likely to significant operational impact; it is felt that suitable operational vehicles are unlikely to be available during GD2, additionally, it is felt his option would inhibit our ability to carry out business as usual.

To achieve this level of ambition would require the following.

- Additional capital investment to cover the cost of more expensive electric vehicles
- Accelerate vehicle replacement programme for diesel vehicles from 8 to 6 years
- High speed charging points and infrastructure installation at our sites
- By the end of GD2, 100% of all vehicles replaced to use ultra-low emission fuels (where possible) e.g. CNG, hybrid, hydrogen or EV
- FCO vehicles – Develop a staged plan to introduce EV with a target to achieve an agreed % at the end of GD1, target areas where there are readily available charging units, include considering when possible subsidised installation of home charging points.

Included in the table above is an estimated reduction in the CO2 as a result of the change from diesel to EV's, the assumption made that the vehicles will continue on the same mileage profile as currently. The reduction in fuel cost is estimated using the current cost of diesel on current volumes, then reducing the volumes used as a percentage corelating to the number of EV's added to the fleet, adding back in 9ppm for large vans and 4ppm for small vans.

It is believed and been indicated in trade press and by manufacturers that EV's will be less expensive to maintain, the exact amount is unknow when operation in different environments, so have assumed a 10% reduction on maintenance budgets through the vehicle's operational life.

7.2 Option 2. 75% of vehicles replaced during GD2 to be EV's

Table 8: Option 2. 75% EV Replacement program

Option 2. 75% EV Replacement in GD2						Total
Year	2022	2023	2024	2025	2026	
EV Vehicle Investment (£m)	2.69	2.75	0.76	3.66	2.19	11.65
Accelerated Replacement 8yr to 6yr	2.18	2.18	2.18	2.18	2.18	12.06
Infrastructure Investment	0.58	0.58	0.58	0.58	0.58	2.91
CO2 Reduction %	-15.40%	-28.29%	-41.19%	-54.08%	-66.98%	-66.98%
Fuel Cost Reduction (£m) Nett	-0.55	-0.96	-1.37	-1.78	-2.19	-6.85
Maintenance Reduction (£m)	-0.03	-0.07	-0.10	-0.14	-0.17	-0.52
Nett Positions (£m)	4.88	4.49	2.05	4.51	2.59	19.24

This option would require careful management and have significant operational impact: to be able to succeed with this option, would be very dependent on availability of operationally suitable EV's which we feel is unlikely.

To achieve this level of ambition would require the following

- Additional capital investment to cover the cost of more expensive Electric vehicles
- Accelerate vehicle replacement programme for diesel vehicles from 8 to 6 years
- High speed charging points and infrastructure installation at our sites
- By the end of GD2, 75 % of all vehicles replaced to use ultra-low emission fuels (where possible) e.g. CNG, Hybrid, Hydrogen or EV
- FCO vehicles – Develop a staged plan to introduce EV with a target to achieve an agreed % at the end of GD1, target areas where there are readily available charging units, include considering when possible subsidised installation of home charging points.
- Introduce CNG option for the heavier commercial vehicles, that return to base daily.

Included in the table above is an estimated reduction in the CO2 as a result of the change from diesel to EV's, the assumption made that the vehicles will continue on the same mileage profile as currently. The reduction in fuel cost is estimated using the current cost of diesel on current volumes, then

reducing the volumes used as a percentage corelating to the number of EV's added to the fleet, adding back in 9ppm for large vans and 4ppm for small vans.

It is believed and been indicated in trade press and by manufacturers that EV's will be less expensive to maintain, the exact amount is unknow when operation in different environments, so have assumed a 10% reduction on maintenance budgets through the vehicle's operational life.

7.3 Option 3. 50% of vehicles replaced during GD2 to be EV's

Table 9: Option 3. 50% Replacement Program

Option 3. 50% EV Replacement in GD2						Total
Year	2,022	2,023	2,024	2,025	2,026	
EV Vehicle Investment (£m)	1.54	1.54	1.53	1.52	1.51	7.63
Accelerated Replacement 8yr to 6yr	2.69	2.75	0.76	3.66	2.19	12.06
Infrastructure Investment	0.39	0.38	0.38	0.38	0.38	1.91
CO2 Reduction %	-9.39%	-18.77%	-28.16%	-37.54%	-46.93%	-46.93%
Fuel Cost Reduction (£m) Nett	-0.32	-0.73	-1.10	-1.47	-1.84	-5.46
Maintenance Reduction (£m)	-0.02	-0.05	-0.07	-0.09	-0.12	-0.35
Nett Positions (£m)	4.28	3.89	1.49	4.00	2.13	15.79

This option would have an operational impact, but we believe if properly managed that impact would be limited

- Additional capital investment to cover the cost of more expensive Electric vehicles
- Accelerate vehicle replacement programme for diesel vehicles from 8 to 6 years
- High speed charging points and infrastructure installation at our sites
- By the end of GD2, 50 % of all vehicles replaced to use ultra-low emission fuels (where possible) e.g. CNG, Hybrid, Hydrogen or EV
- FCO vehicles – Develop a staged plan to introduce EV with a target to achieve an agreed % at the end of GD1, target areas where there are readily available charging units, include considering when possible subsidised installation of home charging points.
- Explore other opportunities to introduce EV's within the small van fleet prior to GD2
- Introduce CNG option for the heavier commercial vehicles, that return to base daily.

Included in the table above is an estimated reduction in the CO2 as a result of the change from diesel to EV's, the assumption made that the vehicles will continue on the same mileage profile as currently. The reduction in fuel cost is estimated using the current cost of diesel on current volumes, then reducing the volumes used as a percentage corelating to the number of EV's added to the fleet, adding back in 9ppm for large vans and 4ppm for small vans.

It is believed and been indicated in trade press and by manufacturers that EV's will be less expensive to maintain, the exact amount is unknow when operation in different environments, so have assumed a 10% reduction on maintenance budgets through the vehicle's operational life.

7.4 Options Technical Summary Table

Financially vehicle replacement age is a trade-off between the cost of the vehicle and maximising that investment versus repair and increasing maintenance costs and reaching that optimum point for both. Operationally the vehicle is required to carry out our business, so there is also a balance when considering vehicle reliability and the impact of unreliable vehicles in terms of both the operation and the cost of additional vehicles to cover breakdown and repair. The addition of a 6-year replacement program and ultra-low emission vehicles will have a positive impact on maintenance cost, fuel, reliability and a reduction on emissions.

Table 10: Capex Requirement for options 1. to 3

Option 1. 100% EV Replacement in GD2						Total
Year	2022	2023	2024	2025	2026	
EV Vehicle Investment (£m)	3.11	3.11	3.11	3.11	3.11	15.53
Accelerated Replacement 8yr to 6yr (£m)	2.69	2.75	0.76	3.66	2.19	12.06
Infrastructure Investment (£m)	0.78	0.78	0.78	0.78	0.78	3.88
Option 2. 75% EV Replacement in GD2						Total
Year	2022	2023	2024	2025	2026	
EV Vehicle Investment (£m)	2.69	2.75	0.76	3.66	2.19	11.65
Accelerated Replacement 8yr to 6yr (£m)	2.18	2.18	2.18	2.18	2.18	12.06
Infrastructure Investment (£m)	0.58	0.58	0.58	0.58	0.58	2.91
Option 3. 50% EV Replacement in GD2						Total
Year	2022	2023	2024	2025	2026	
EV Vehicle Investment (£m)	1.54	1.54	1.53	1.52	1.51	7.63
Accelerated Replacement 8yr to 6yr (£m)	2.69	2.75	0.76	3.66	2.19	12.06
Infrastructure Investment (£m)	0.39	0.38	0.38	0.38	0.38	1.91

Table 11: Option Technical Summary

Option	First Year of Spend	Final Year of Spend	Volume of Interventions	Equipment / Investment Design Life	Total Cost
Do Nothing	2021	2021	0	N/A	54.45
100% EV Replacement Vans in GD2	2021	2025	1550	6 Years	71.50
75% EV Replacement Vans in GD2	2021	2025	1163	6 Years	68.92
50% EV Replacement Vans in GD2	2021	2025	775	6 Years	66.28

7.5 Options Cost Summary Table

The projected cost of doing nothing in the fleet EAP in GD2 would only see a minimal change in the environmental impact of our fleet, maintaining the replacement schedule at 8-years on a like for like replacement program would see an estimated c.6% reduction in emissions during GD2.

Table 12: Capex and Opex summary options 1. to 3.

Option 1. 100% EV Replacement in GD2						Total
Year	2022	2023	2024	2025	2026	
EV Vehide Investment (£m)	3.11	3.11	3.11	3.11	3.11	15.53
Accelerated Replacement 8yr to 6yr (£m)	2.69	2.75	0.76	3.66	2.19	12.06
Infrastructure Investment (£m)	0.78	0.78	0.78	0.78	0.78	3.88
CO2 Reduction %	-19.14%	-35.78%	-52.42%	-69.06%	-85.69%	-85.69%
Fuel Cost Reduction (£m) Nett	-0.65	-1.17	-1.69	-2.21	-2.72	-8.45
Maintenance Reduction (£m)	-0.05	-0.09	-0.14	-0.19	-0.23	-0.70
Nett Positions (£m)	5.87	5.37	2.81	5.15	3.12	22.32

Option 2. 75% EV Replacement in GD2						Total
Year	2022	2023	2024	2025	2026	
EV Vehide Investment (£m)	2.69	2.75	0.76	3.66	2.19	11.65
Accelerated Replacement 8yr to 6yr	2.18	2.18	2.18	2.18	2.18	12.06
Infrastructure Investment	0.58	0.58	0.58	0.58	0.58	2.91
CO2 Reduction %	-15.40%	-28.29%	-41.19%	-54.08%	-66.98%	-66.98%
Fuel Cost Reduction (£m) Nett	-0.55	-0.96	-1.37	-1.78	-2.19	-6.85
Maintenance Reduction (£m)	-0.03	-0.07	-0.10	-0.14	-0.17	-0.52
Nett Positions (£m)	4.88	4.49	2.05	4.51	2.59	19.24

Option 3. 50% EV Replacement in GD2						Total
Year	2,022	2,023	2,024	2,025	2,026	
EV Vehide Investment (£m)	1.54	1.54	1.53	1.52	1.51	7.63
Accelerated Replacement 8yr to 6yr	2.69	2.75	0.76	3.66	2.19	12.06
Infrastructure Investment	0.39	0.38	0.38	0.38	0.38	1.91
CO2 Reduction %	-9.39%	-18.77%	-28.16%	-37.54%	-46.93%	-46.93%
Fuel Cost Reduction (£m) Nett	-0.32	-0.73	-1.10	-1.47	-1.84	-5.46
Maintenance Reduction (£m)	-0.02	-0.05	-0.07	-0.09	-0.12	-0.35
Nett Positions (£m)	4.28	3.89	1.49	4.00	2.13	15.79

8 Business Case Outline and Discussion

If we do nothing, then our Scope 1 and Scope 2 carbon footprint will not reduce in size. As per the requirements of achieving the UK and Scottish Governments Net Zero target by 2050 and 2045 respectively, we must make reductions across many areas of our Business Carbon Footprint, including Fleet.

The project maintains and refreshes the fleet to an acceptable level in order to support operatives in the delivery of services to customers and in the mid (4-10yr) and more so for the longer term (10yr+) to significantly reduce the emissions generated by our vehicle Fleet.

An important aspect to our plans is how the wider industry develops from 2019 on towards 2021 (start of GD2) and throughout GD2 to 2026. It is highly probable that we will end GD2 in 2026 with a very different make-up of our vehicles, but the same will be true of other large fleets, as-well as commuting and private vehicles. There will need to be decisions on infrastructure soon by the UK government to support what will be a wave of change across the private and commercial vehicle industry. For that

reason, our ambition is limited to what vehicles are available but as stated previously we already could investigate and replace some of our smallest vans with EVs.

We will conduct a six-monthly review from now on and throughout GD2 with the Fleet Manager, the Head of SHE, Senior operations and a commercial manager to understand if and what new technology may be available in the market at that time and therefore if and what vehicles could continue to be fuelled differently.

Given the uncertainty of both the future of gas and the availability of suitable alternate fuel technology at this time, we have proposed that up to 50% of our fleet will be alternate fuel by the end of GD2. However, once the Government's heat policy is announced, currently expected in 2023, we would like to use Ofgem's proposed use it or lose it mechanism.

8.1 Key Business Case Drivers Description

The options 1. 2. and 3. listed in table 13 below is the cost in addition to option 4 the baseline. The plan is to accelerate the replacement program to 6 years and the table sets out the additional cost to do this along with the additional cost of EV's and charging infrastructure, for options 1. and 2. we are not confident if or not suitable vehicle will be available on the market, and it is unclear if the operation can accommodate them without significant changes and the cost or service issues this could create. Option 3. gives the opportunity to replace a significant part of the fleet with cleaner more modern diesel and compliment that with the introduction of ultra-low emission vehicles, with the benefit of lower emissions, reduced fuel cost and lower maintenance costs.

Table 13: Summary of Key Value Drivers

Option	Option Desc.	Template	Total Cost (£m)
1	**100% EV Replacement Vans in GD2**	New Vans EV additional Cost	**15.55**
		EV Charging Points	**3.90**
		New Vans Accelerated Replacement	**12.06**
2	**75% EV Replacement Vans in GD2**	New Vans EV additional Cost	**11.65**
		EV Charging Points	**2.90**
		New Vans Accelerated Replacement	**12.06**
3	**50% EV Replacement Vans in GD2**	New Vans EV additional Cost	**7.63**
		EV Charging Points	**1.91**
		New Vans Accelerated Replacement	**12.06**

Table 14: NPVs based on Payback Periods (absolute, £m)

Option No.	Desc. of Option	Preferred Option (Y/N)	Total Forecast Expenditure (£m)	Total NPV	2030	2035	2040	2050
Baseline	Do Nothing / Do minimum	N	-54	-149	-113	-131	-138	-145
1	Option 1 Absolute NPV	N	-72	-108	-81	-92	-98	-104
2	Option 2 Absolute NPV	N	-69	-117	-89	-102	-108	-114
3	Option 3 Absolute NPV	Y	-66	-127	-97	-111	-117	-124
1	Option 1 NPV relative to Baseline	N	-72	-108	32	39	40	41
2	Option 2 NPV Relative to Baseline	N	-69	-117	24	29	30	31
3	Option 3 NPV Relative to Baseline	Y	-66	-127	16	20	20	21

8.2 Business Case Summary

This project is driven by two primary requirements, to operate a cost-effective reliable fleet that meets our commitment to our customers in terms of service delivery and safety, and from stakeholder engagement and feedback, have an ambitious plan to reduce the environmental impact of the necessary operation of a large commercial fleet of vehicles.

Table 15: Business Case Matrix

	100% EV Replacement Vans in GD2	75% EV Replacement Vans in GD2	50% EV Replacement Vans in GD2
GD2 Capex (£m)	31.51	26.61	21.59
Number of Interventions	1550	1163	775
Carbon Savings ktCO2e (GD2)	0.00	0.00	-
Carbon Savings ktCO2e /yr	0.00	0.00	0
Carbon Emission Savings (35yr PV, £m)	0.00	0.00	0.00
Other Environmental Savings (35yr PV, £m)	37.80	28.61	19.41
Safety Benefits (35yr PV, £m)	0.00	0.00	0.00
Other Benefits (35yr PV, £m)	0.00	0.00	0.00
Direct Costs (35yr PV, £m)	3.59	2.85	2.07
NPV (35yr PV, £m)	41.40	31.46	21.49
High Carbon Scenario			
Carbon Emission Savings (35yr PV, £m)	0.00	0.00	0.00
High Carbon NPV (35yr PV, £m)	41.40	31.46	21.49

9 Preferred Option Scope and Project Plan

9.1 Preferred option - Option 3

SGN's ambition is to evaluate every opportunity in its operational and procurement process to reduce the environmental impact of its fleet, whilst being ever mindful of its responsibility to deliver safe and efficient service to its customers. The investment required to update the fleet, and to introduce alternate fuelled vehicles with the supporting refuelling infrastructure is significant, and to accommodate alternate fuelled vehicles will likely require changes to operational methods, which again may have a cost impact. The Environmental Action Plan is in addition to the planned vehicle replacement program for GD2, reducing the replacement cycle from 8 years to 6 years, with the additional investment requirement reflecting the level of ambition as detailed below.

Option 3. is our preferred option to operate 50% alternate fuelled vehicles by the end of GD2, the limiting factors being manufacturer lead times from introduction, to mass production and order to delivery, with our operational teams needing time and opportunity to properly test and evaluate them and reducing the risk to critical services but have the flexibility to increase that ambition should a change in vehicle technology or working practices allow.

9.2 Asset Health Spend Profile

The following table is a summary of the annual spend for the preferred option 3. in GD2. in (£m's).

Table 16: Asset Health Spend Profile (£m)

	2021/22	2022/23	2023/24	2024/25	2025/26
50% EV Replacement Vans in GD2	15.25	14.53	11.65	13.46	11.39

9.3 Investment Risk Discussion

From the options discussed on the replacement vehicle program, and the risk of allowing the fleet to age from a reduced investment of a 10-year replacement program, which we believe from the current data would have a progressively bigger impact on maintenance cost, reliability and adverse operational impact and cost as a result of the reliability issues. To maintain the current risk and replace on 8-year was considered, this making the assumption the current fleet including future replacements would continue to perform the same on cost and reliability.

The preferred option which considers the stakeholder feedback and our ambition to reduce the environmental impact of our fleet is to replace at 6-years, the benefit of this option along with the Environmental Action plan should be as we move through GD2 a reducing cost in vehicle maintenance as the overall age of the fleet reduces and the expected slightly lower maintenance cost of EV's. The additional investment required for the 6-year replacement program and the additional cost of EV's and charging infrastructure is significant, with the risk that available suitable vehicles may not become available during GD2 or until later in GD2, particularly for the larger repair and team vehicles, however by concentrating on the smaller vans were technology look more likely to be available would help mitigate the risk and achieve our ambition.

Table 17: Sensitivity Analysis

Spend Area	Scenario	Justification
Capex	High	SGN has applied a 20% increase on the capital expenditure as this we believe to be the potential cost increase, by not tendering and achieving best possible market prices or manufacturer discounts soften and residual values on diesel vehicles has an adverse effect on the market
	Mid	No change on original baseline.
	Low	SGN has applied a reduction of 10% on the capital expenditure which can be applied if we achieve greater than expected discounts on vehicles or vehicle fitout cost
Opex	High	SGN has applied a 20% increase in the Opex cost as we believe this to be a potential maintenance and repair cost resulting from modern vehicles increased technology, and the trend to replace components rather than repair and the true unknown cost of maintenance and repair of alternate fuelled vehicles
	Mid	No change on original baseline.
	Low	SGN has applied a 10% reduction in Opex cost, as with modern technology there is a possibility that repairs and fault notifications, may pre-empt expensive repairs.
Environmental Cost	High	SGN has applied a 20% increase in the environmental cost, the assumption of new vehicles being cleaner or more efficient may not be achievable post Euro VI engines, also as UK roads become more congested there could be a likelihood of increased stationary idling time
	Mid	No change on original baseline.
	Low	SGN has applied a 10% in the environmental cost, as new vehicles deliver better than expected emissions and technology has a positive impact on routing and drivers environmental driving styles.

Table 18: Sensitivity Results

	Low	Mid	High
GD2 Capex (£m)	19.43	21.59	25.91
Number of Interventions	775	775	775
Carbon Savings ktCO2e (GD2)	0.00	0.00	0.00
Carbon Savings ktCO2e /yr.	0.00	0.00	0.00
Carbon Emission Savings (35yr PV, £m)	0.00	0.00	0.00
Other Environmental Savings (35yr PV, £m)	17.47	19.41	23.30
Safety Benefits (35yr PV, £m)	0.00	0.00	0.00
Other Benefits (35yr PV, £m)	0.00	0.00	0.00
Direct Costs (35yr PV, £m)	1.67	1.85	2.22
NPV (35yr PV, £m)	19.14	21.26	25.52

Project payback has not been carried out as part of this analysis due to the effect of the Spackman approach. For a cash-flow traditional project payback period please see scenario 4 of our Capitalisation Sensitivity table.

Appendix

Table 19: Acronyms

Acronym	Description
EV	Electric vehicle
CNG	Compressed natural gas
EAP	Environmental action plan