Annual Status and Options Report

Roads Infrastructure
November 2020

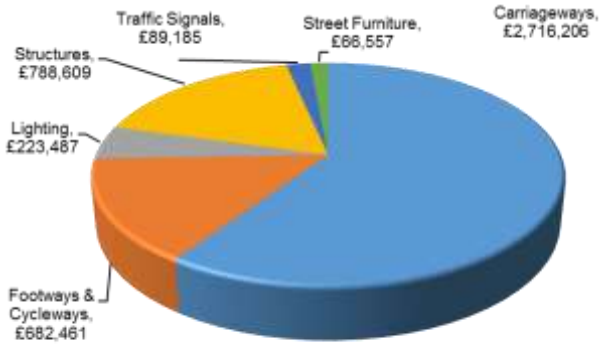
Contents

1.0 Introduction

The Annual Status and Options Report is a product of our Road Asset Management Plan. It records the condition of our road assets and provides a means of identifying and prioritising the overall funding needs.

This report discusses the status of our road assets in terms of extent, value and condition and presents the projected outcome of a number of investment options. The options and scenarios presented aim to assist with the budget setting process and identify where investment should be prioritised.

Latest figures indicate that the cost of replacing all road infrastructure assets is estimated at £4.57bn. The pie chart below details the value of the assets broken down by asset type.



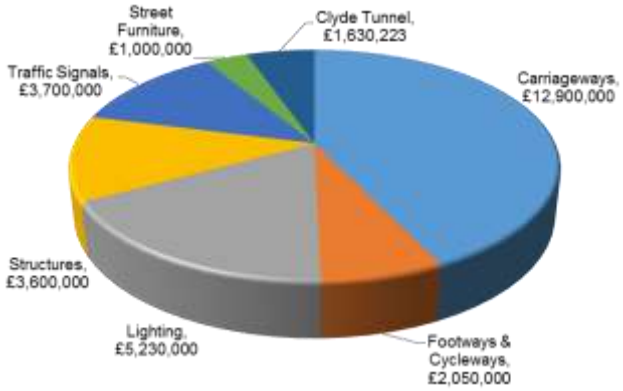
Gross Replacement Cost per Asset (£'000)

The level of investment required to maintain our roads infrastructure in its current condition (steady state) is estimated at £30.11m per year; this equates to an annual investment of 0.66% of the total asset value.

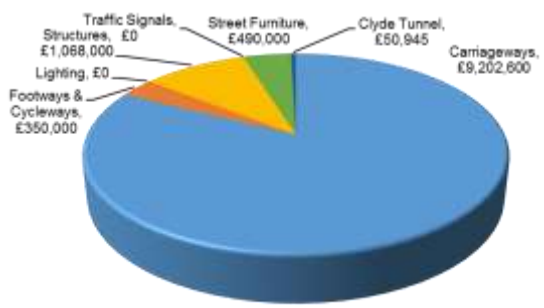
The Report contains a section for each road asset that outlines;

1. Asset Overview
2. Asset Condition
3. Investment Options

The pie charts below illustrate and compares the annual level of investment required to maintain the asset in its current condition against the current level of investment. It should be noted that the current investment only includes the additional budget allocation for the current year that can be attributed to works that will improve the condition of the asset and not cyclic or reactive maintenance budgets or budget allocations reported in previous years ASOR's.



Steady State Investment - £30.11m



Current Investment - £11.16m

COVID-19 Implications

The COVID-19 pandemic has had major implications on our ability to deliver planned programmes of work due to the Government lockdown restrictions, the requirement for social distancing on all work sites and the redeployment of resources to assist with the COVID-19 response. Although the impact of this has not yet been quantified it is likely that this will result in deterioration to all asset groups.

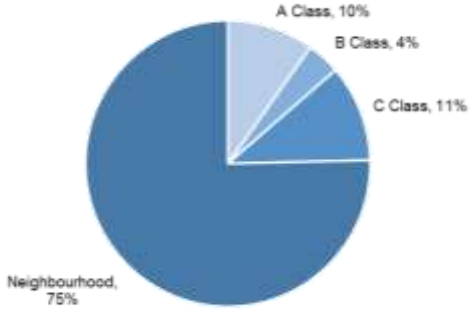
In addition to physical restrictions, the pandemic has also impacted upon data gathering exercises that are used to provide key information in the Annual Status and Options Report. For example, the Annual Household Survey which gives data on customer satisfaction for a number of Services was not able to be carried out in 2020.

It should also be noted that the publicly reported data used in this report, such as pothole reports and traffic signal faults, has been affected and numbers are lower for 2020 which is likely due to the reduced number of people driving, commuting etc.

2.0 Carriageways

2.1 Asset Overview

Glasgow City Council is responsible for the management and maintenance of 1,906km of carriageways. Neighbourhood carriageways represent the majority of Glasgow's network (75%).



A Class	188km
B Class	72km
C Class	209km
Neighbourhood	1437km

Figure 1.0 – Carriageway Length

Since 2013 the condition of our carriageways has steadily improved due to sustained investment. Condition data for 2020 has been delayed due to COVID-19 and is not yet available, however, the latest condition data indicates that 71.1% of our carriageways are in an acceptable condition. This compares favourably with the latest available Scottish average of 63.7% of carriageways in acceptable condition.

Managing Potholes

The extreme winter weather of 2009/10 and 2010/11 resulted in an increase in public pothole reports to over 19,000 in 2011. Increased levels of investment from 2010/11 enabled the number of potholes to reduce significantly, with the number of potholes falling to less than 3,500 in 2016.

The severe winter and 'The Beast from the East' in 2017/18 saw an increase in public pothole reports to over 10,000 in 2018/19, but compared favourably to the figure following the last severe winters. This fell to approximately 7,500 in 2019/20. The impact extreme winter weather has on the condition of our carriageways is clear.

The number of public pothole reports for 2020/21 is projected to be under 3,500, dependent on the severity of the upcoming winter, however, it is believed that this is figure has been impacted by the COVID-19 pandemic and the reduced number of road users.

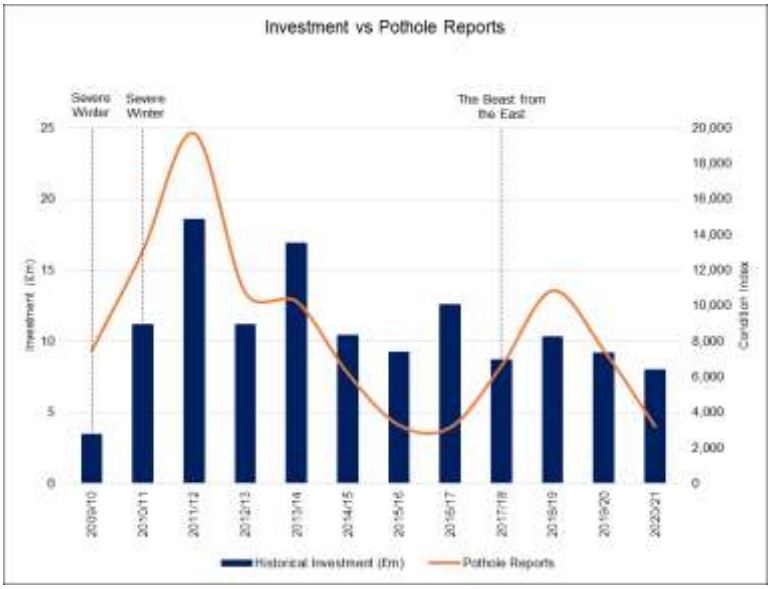


Figure 2.0 – Public Potholes Reports vs. Investment

Customer Satisfaction

Although recent investment strategies improved the level of customer satisfaction, which is measured by an annual household survey (it should be noted that this survey was not carried out in 2020), there remains a risk of structural deterioration and, in the event of a subsequent bad winter, the number of potholes will increase significantly.

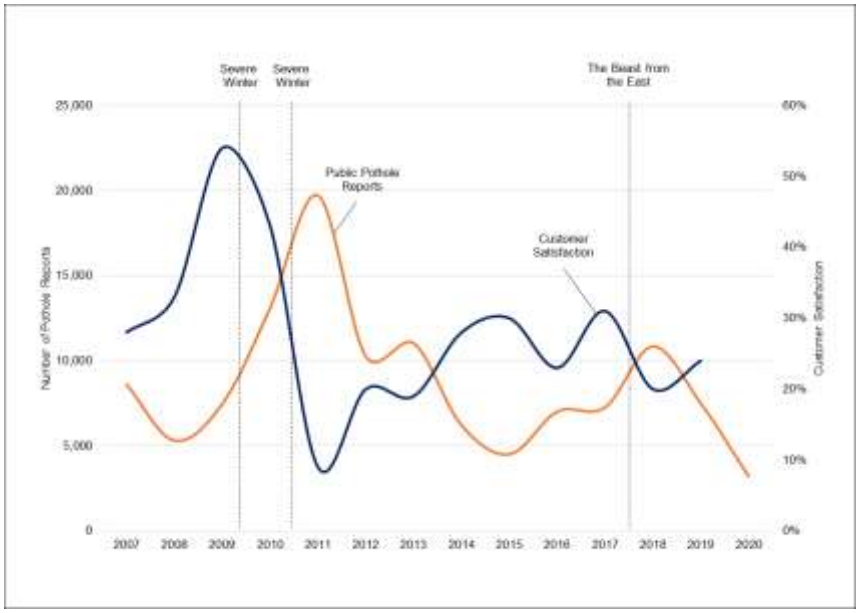


Figure 3.0 – Public Pothole Reports vs. Customer Satisfaction

2.2 Asset Condition

Road condition is measured by the Scottish Road Maintenance Condition Survey (SRMCS). The survey assesses parameters including smoothness, rutting, surface texture and surface cracking. This provides an indication of the integrity of the unseen road structure and provides a measure of the percentage of carriageways that should be considered for future maintenance treatment.

Table 3.0 shows that the overall condition of our carriageways has slowly improved over the last 7 years, with our neighbourhood roads improving at a faster rate than our main roads. It should be noted that 19/20 data is not yet available.

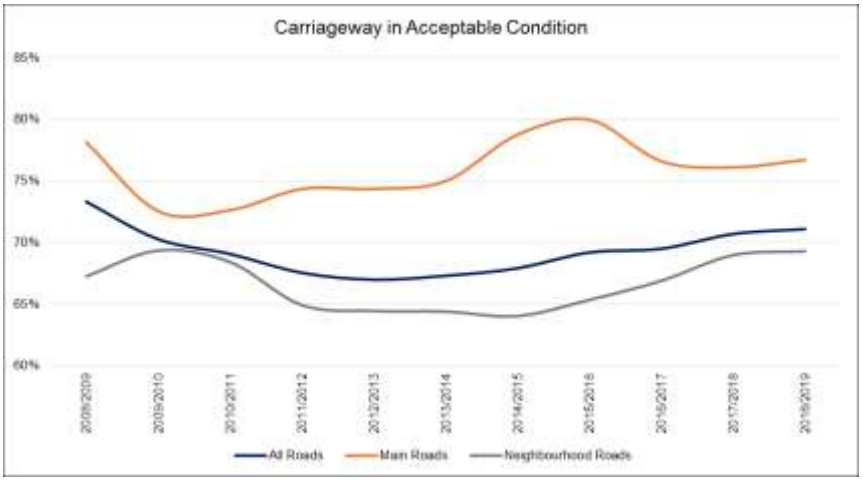


Figure 4.0 – Carriageway in Acceptable Condition

The improvement in carriageway condition is reflected in the value of vehicle damage claims settled; this reduced from over £500k in 2011/12 to less than £10k in 2019/20.

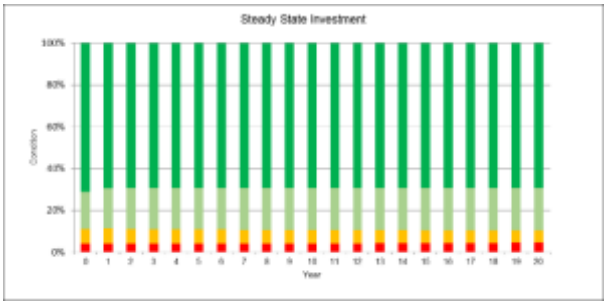
2.3 Carriageway Investment Options

Road infrastructure deterioration is slow. It is affected by external factors and is often unseen, meaning that any impact of investment cannot be assessed in the short term. The investment options presented below consider the projected impact over a 20 year life cycles. This allows decisions to be taken with an understanding of medium and long-term implications.

The financial tools used to develop forecasts consider the existing condition of our infrastructure and the cost of various remedial treatments. It is noted that no allowance has been made for construction inflation; forecasts are based on current market prices.

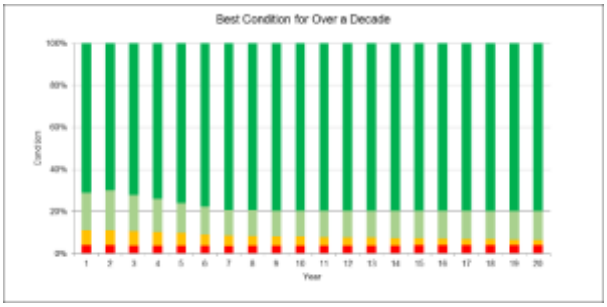
Option 1 – No Investment
No investment in the carriageway asset would lead to severe deterioration, with 79% of carriageways in poor condition after 20 years. This scenario would see a dramatic increase in the number of potholes reported, the cost of temporary repairs and cause severe reputational and economic damage to the City.

20 Year Investment: £0m



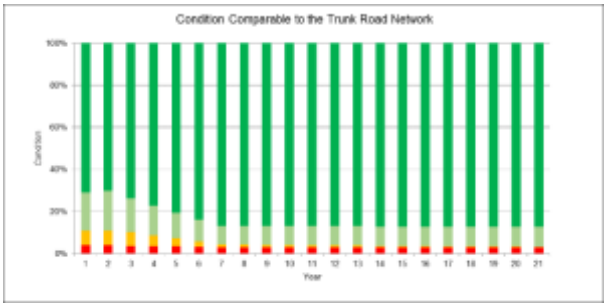
Option 2 – Steady State
An annual investment of £12.9m is required to maintain the existing condition of our carriageways.

20 Year Investment: £258m



Option 3 – Best Condition in Over a Decade
An annual investment of £19.2m over 5 years would reduce the percentage of carriageway requiring attention to 20% of the network. The condition could then be maintained at this level for £10.6m per annum. This investment scenario would result in Glasgow's road network being in its best condition for over a decade. It would also mean Glasgow's roads would be the best in Scotland.

20 Year Investment: £255m



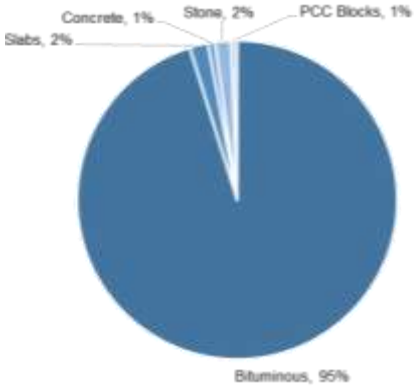
Option 4 – Comparable to Scotland's Trunk Roads
An annual investment of £23.3m over 5 years would reduce the percentage of carriageway requiring attention to 13% of the network. This would mean the condition of Glasgow's roads would be comparable to Scotland's trunk road network. The condition of the carriageway asset could then be maintained at this level for £11.45m per annum.

20 Year Investment: £288m

3.0 Footways

3.1 Asset Overview

Glasgow City Council is responsible for the maintenance of 3,124km of footways.



Bituminous	2974km
PCC Slabs	58km
Concrete	22km
Stone	51km
PCC Blocks	19km

Figure 1.0 – Footway Length

Impact of Recent Investment

The condition of footways is the most significant factor in the number of public injury claims. The completion of a £5m investment programme in 2018/19 that focused on highly pedestrianised neighbourhood thoroughfares was successful in delivering a safer, cleaner and more pleasant environment in 24 of the busiest neighbourhood shopping areas. Although these footways make up a small proportion of the network (7.5%) a high proportion of trips and falls (36%) occur at these locations.

While the number of footway claims settled has reduced in since 2014, investment prior to 2017/18 was less than required to maintain steady state condition.

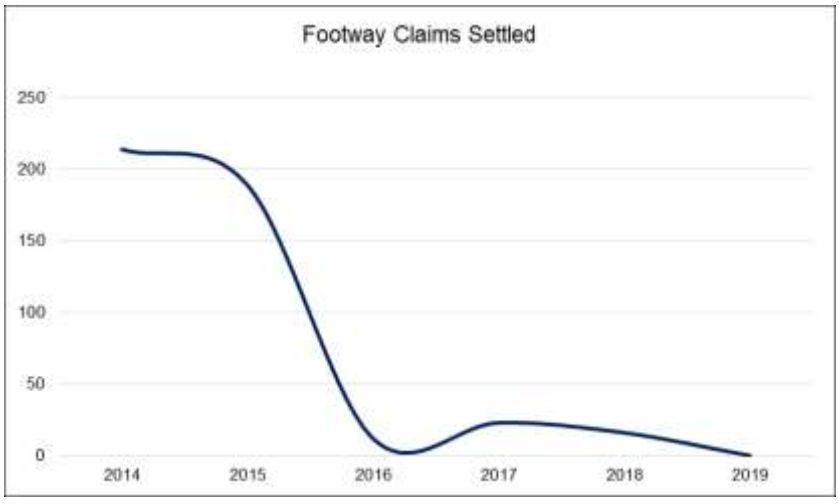


Figure 2.0 – Footway Claims Settled

Public Realm

Public realm footways are highly pedestrianised, high amenity areas such as the City Centre and key local centres. Many of these footways have a more aesthetically pleasing, natural stone surface that is more costly to maintain that typical bituminous surfaces.

The construction of the 17 schemes that make up the £115m Avenues Project and the expansion of public realm areas will require the management of the footway asset and how we align the footway maintenance budget to be considered due to the different maintenance requirements needed.

Customer Satisfaction

Customer satisfaction, which is measured by an annual household survey (it should be noted that this survey was not carried out in 2020), has steadily improved since 2011. This is attributed to sustained investment to improve the condition of our neighbourhood footways utilising value for money treatments to prolong the life of these footways by sealing the surface, whilst removing minor defects. The 5% fall in satisfaction levels from 2017 is attributed to 'The Beast from the East'.

Figure 3.0 – Customer Satisfaction

3.2 Asset Condition

Our most recent footway condition data indicates that 2.1% (approximately 66km) of our footways exhibit major or structural deterioration and 11.0% (approximately 345km) exhibit minor deterioration such as cracking and oxidisation.

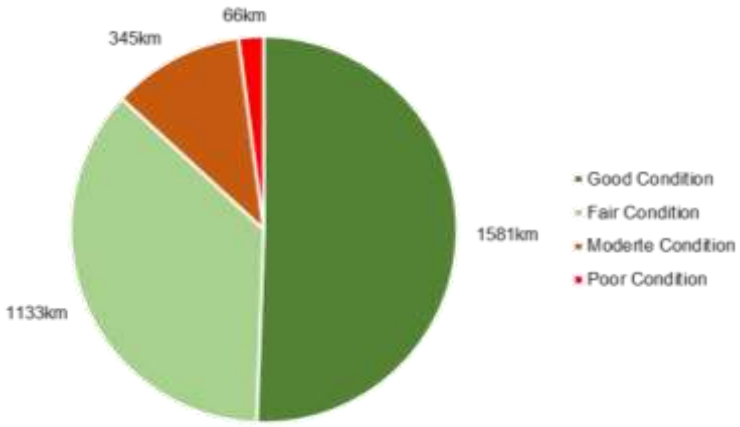
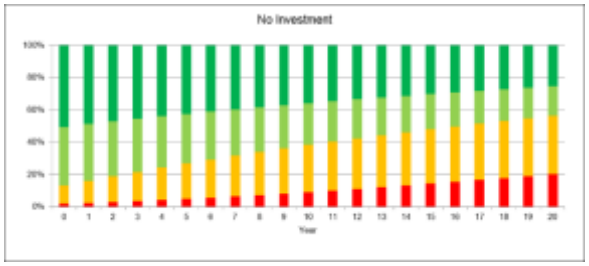


Figure 4.0 – Footway Condition

3.3 Footway Investment Options

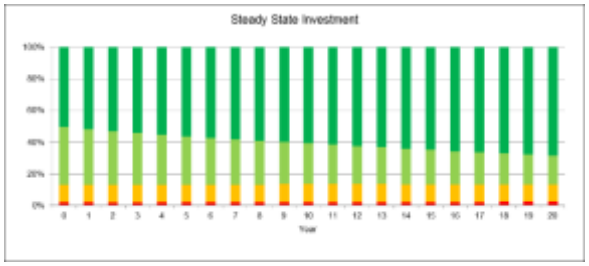
A sustained level of investment in the short term would deliver noticeable improvement in the condition of our footways.

The investment scenarios outlined below improve condition in the short and medium term whilst offering value in the longer term.



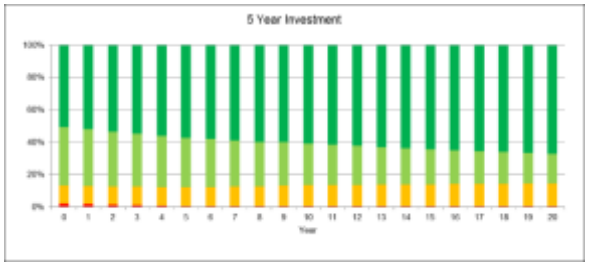
Option 1 – No Investment
No further investment in the asset would lead to severe deterioration, with over half of footways in poor condition after 20 years. This option would result in significant risk to public safety and dramatically increase the number of slips trips and falls and the cost of reactive repairs.

20 Year Investment: £0m



Option 2 – Steady State
An annual investment of £2.05m is required to maintain the existing condition our footway network.

20 Year Investment: £41m



Option 3 – 5 Year Plan
An annual investment of £3.42m for 5 years would remove all footways exhibiting major defects and structural deterioration (red condition footways). The steady state amount thereafter to maintain the condition level at approximately 11%, with the red condition footways remaining at 0%, would be £2.14m per annum.

20 Year Investment: £49.2m

Option 4 – 10 Year Plan
An annual investment of £3.07m for 10 years would remove all red condition footways. The steady state amount thereafter to maintain the condition level at 10%, with the red condition footways remaining at 0%, would be £2m per annum.

20 Year Investment: £50.7m

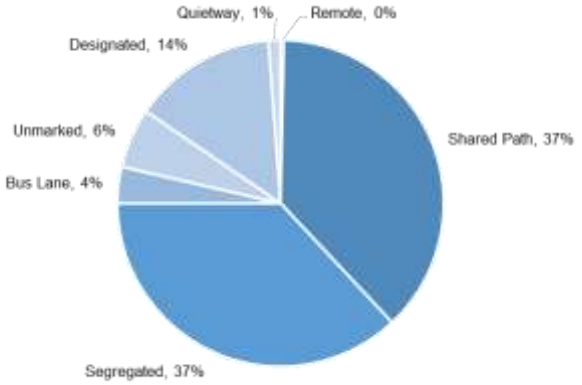
4.0 Cycleways

4.1 Asset Overview

Glasgow's active travel network currently consists of 290km of cycle infrastructure, made up of primary and secondary routes in addition to permeable, residential zones.

As the cycle network continues to expand and be improved we are still collecting data to assist and inform future maintenance requirements. An assessment of the 91km primary cycle network was completed in 2019.

61km of the primary cycle network is on the publically adopted Road Network for which Glasgow City Council has a statutory duty to maintain. The remaining 30km is situated on Private land consists of sections of the National Cycle Network (NCN) 7, NCN 754 and Forth and Clyde Canal track.



Shared Path	22.9km
Segregated	22.4km
Designated	8.6km
Unmarked	3.6km
Bus Lane	2.2km
Quietway	0.7km
Remote	0.2km

Figure 1.0 – Primary Cycle Network Length Maintained by GCC

Impact of Recent Investment

Since 2010/11 investment in active travel has increased from £1.63 per head of population to circa £10 per head.

The allocation of £1.85m of capital investment in 2019/20 allowed for the further development of the cycle network. Upcoming developments include the Yorkhill/Kelvingrove cycle village, the Connecting Woodside project and the Sighthill cycle village.

In addition, work on the four City Way projects is progressing to create segregated cycleways and improve connectivity with existing cycle routes to improve links between the City Centre and neighbourhoods. The East City Way Phase 1 at Mount Vernon is currently under construction and due to be completed in March 2021. The South City Way (SCW), connecting Queens Park to the City Centre, is currently under construction and two phases (of 5) are complete with Phase 3 expected by the end of November 2020. Design work for SCW Phases 4 & 5 continues and construction is estimated to be completed in 2021/2022.

Cycling potential, safety and connectivity are assessed to prioritise investment. This approach maximises benefits, with the key objective of increasing active and sustainable travel uptake. Between 2009 and 2018, the number of cycle trips into and out of the City Centre has increased by 111%.

Customer Satisfaction

A recent survey, audited by Sustrans (Bike Life 2018), indicated that 43% of the public approve the design and cohesiveness of current cycle network. Additionally, 39% of the public stated that the condition of the cycle network is good.

New Infrastructure and Maintenance

The expansion of the Glasgow cycle network at a significant rate and the installation of associated infrastructure creates new challenges due to the specialised maintenance and labour required to maintain this network. Various materials have been utilised to provide a more aesthetically pleasing

environment and enable a smoother ride which is more costly to maintain than a typical bituminous surface This is also a public concern as a recent survey regarding the development of the South City way indicated that 8% of respondents were worried about the future routine maintenance of cycle network.

The specialist routine and cyclic maintenance requirements of a segregated cycleway also creates an increased burden on resources. The management of the asset and how we align future maintenance budgets will have to be considered as a result of the expansion of the cycle network due to these different maintenance requirements.

An example of exploring different maintenance techniques was the joint funding by Glasgow City Council and Sustrans of a multipurpose vehicle that can be used all year round to maintain this new infrastructure and can carry out a variety of functions, such as; winter maintenance, weed and grass cutting and sweeping. It is anticipated that for every additional 25km of segregated cycleway installed, a new multi-purpose vehicle, costing approximately £130k, and operatives will be required to maintain current levels of service.

4.2 Asset Condition

The latest condition data of the primary cycle network maintained by Glasgow City Council indicate that 94% of the asset is in good or fair condition. This reflects the fact that much of this infrastructure is relatively new.

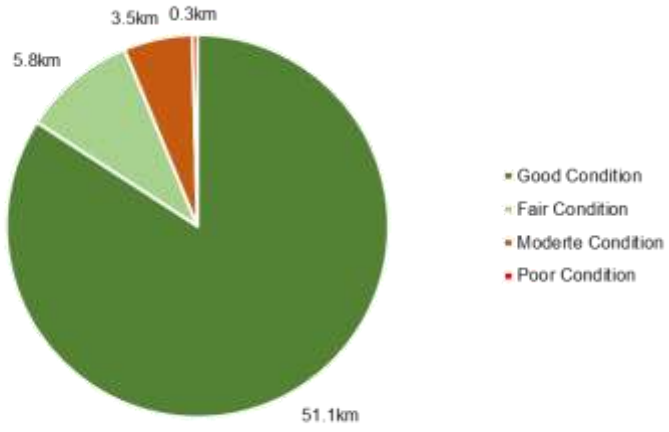


Figure 2.0 – Primary Cycle Network Condition

4.3 Cycleway Investment Options

Investment Option: Maintain the Current Condition of the Primary Cycle Network

An annual investment of £55k would enable the existing condition of the primary cycle network of 6% requiring attention to be maintained. Investment under this level would lead to deterioration of the primary cycle network and provide less scope for cost effective planned maintenance of the unique maintenance aspects of this asset.

5.0 Road Drainage

5.1 Asset Overview

Our road drainage systems comprise of approximately 74,000 gullies (stanks), 2,500km of road drains, manholes, pumps, kerb drains and a variety of Sustainable Urban Drainage Systems (SUDS). These assets form an integral part of the public road and failure to maintain them will compromise the integrity of the entire road structure and cause significant disruption to the network during storm events.

Impact of Recent Investment

Investment totalling £200,000 in 2019/20 resolved longstanding drainage problems at locations city wide including; the M8 on ramp at Charing Cross, Maryhill Road, Great Western Road, St Andrews Drive, Mansionhouse Road, Pollokshaws Road and Edinburgh Road. For the current financial year, there is no dedicated Roads investment for drainage investigation.

The Council is making significant investment in reducing flood risk and increasing drainage capacity. A number of City Deal programmes have a reduction in flood risk and increased drainage capacity as an objective including the City Centre Avenues and the Canal & North Gateway Smart Canal.

In order to ensure the significant Capital investment continues to function, as designed, for future years, it is vital that appropriate maintenance is funded and delivered for new assets alongside maintaining existing assets. Failure to do so will reduce performance and increase costs associated with reacting to incidents, both for the Council and communities.

Targeted investment has enabled the number of blocked gully reports to reduce from over 3,000 reports in 2013 to approximately 1,200 reports in 2018. The increase in 2019 to approximately 1,900 reports is attributed to more frequent and intense storms throughout the year. Detailed investigation and surveys of problem areas, well managed cyclic maintenance programmes and the annual leaf fall strategy have all contributed to improve the resilience of our road drains over recent years.

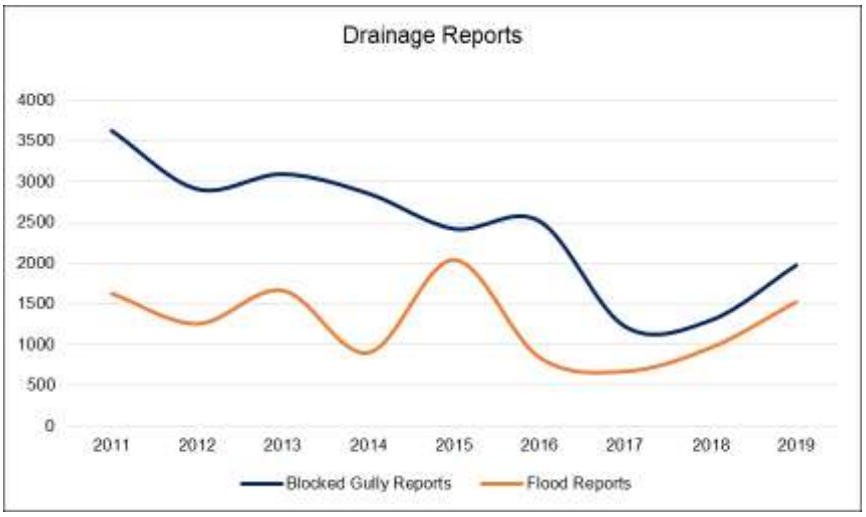


Figure 1.0 – Blocked Gully & Flood Reports

Climate Change Implications

It is recognised that flood risk and climate change continue to present a significant environmental risk to the city. Climate change has implications for the road drainage systems, with higher intensity storms predicted to become more frequent. August 2019 was the wettest on record for Glasgow and saw the number of blocked gully reports increase to 489 compared to 160 in August 2018.

The Council is making significant investment in reducing flood risk and increasing drainage capacity. Three City Deal programmes have a reduction in flood risk and increased drainage capacity as an objective including the City Centre Avenues, Canal & North Gateway Smart Canal and MGSDP. The MGSDP City Deal project alone is a £47.5m investment across 14 sites where a range of interventions as part of surface water management plans including upsized watercourse channels,

basins, surface water sewers, below ground storage and raingardens are being delivered. Other recent investment by the Council to mitigate flood risk and reduce the impacts on key infrastructure include completion of the White Cart Water Flood Prevention Scheme Phase 3.

Over and above the investment being made by the Council, our strategic MGSDP drainage partner Scottish Water has also committed significant investment to reduce flood risk and improve drainage capacity within the city including the completion of the £100m Shieldhall Tunnel project.

Despite these record levels of investment, it is recognised that flood risk and climate change continue to present a significant environmental risk to the city. SEPA in 2018 estimated that a 1 in 200 year/0.5% probability event across the city would flood 45,000 properties, although this is probably an under estimate as it was based on now superseded rainfall and climate change data.

The MGSDP is currently developing a route map that will end uncontrolled flooding in the city for a 1 in 200 year/0.5% probability event by 2060. It is likely that this route map will identify the need for increased levels of investment in order to deliver a range of interventions similar to the City Deal inventions noted above alongside a Property Level Protection initiative.

In order to ensure the significant capital investment continues to function, as designed, for future years, it is vital that appropriate maintenance is funded and delivered for new assets alongside maintaining existing assets. Failure to do so will reduce performance and increase costs associated with reacting to incidents, both for the Council and communities.

5.2 Asset Condition

In addition to strategic initiatives it is acknowledged that Glasgow's road drainage system is a historic system built up over a number of years and can be subject to blockages and failures. To mitigate the impact of this we are in the process of undertaking a "root and branch" drainage review whereby we are digitally mapping blocked gully and flood report data in order to re-prioritise cyclic gully cleaning and drainage repair works. This will ensure that resources are targeted to where they will achieve maximum benefit to communities in addition to freeing up resources to quickly attend to reports of flooding.

5.3 Road Drainage Investment Options

Investment Option: Investigation and Repair

The condition of the existing road surface water drainage assets is currently not well developed due a combination of factors including the lack of historical records and the expense of data collection. It is therefore difficult to accurately predict future investment needs. However inventory data collection is now being undertaken as part of our gully review and will be used to inform future investment needs

Problematic flood locations continue to be identified city wide. System failures can be attributed to blocked or damaged gullies, broken pipes and more complex issues relating to Scottish Water sewer capacity and topography.

Recent investment has enabled us to investigate and repair many of these recurring flood locations to further reduce flood reports and minimise network disruption during periods of inclement weather.

Based on average scheme costs in the past few years, it is estimated that an investment of £500k per annum would enable us to continue to maintain the road drainage asset and improve the level of customer satisfaction.

We planned to undertake work in 2020 to identify how to improve the asset condition information based on UK best practice which would allow us to improve our ability to quantify the problems, however, this work was delayed due to the COVID-19 pandemic and will now be undertaken in 2021.

6.0 Lighting

6.1 Asset Overview

The Council's street lighting network consists of over 72,000 lighting supports and over 72,250 lanterns.

Impact of Recent Investment

In recent years, there has been a number of lighting column failures which are being addressed by a column replacement programme. The commencement of this programme, aligning with our Risk Management Strategy, has seen this risk reduce significantly.

Over 2,500 columns have been replaced as part of this programme to date with work underway to replace up to another 2,000 columns. This latest tranche also includes the fitting of LED lanterns.

Over 19,750 LED lantern upgrades have now been installed throughout Glasgow. As part of this, the City Centre Intelligent Street Lighting Project (ISL) is ongoing and the replacement of 3,100 lanterns with new LED lanterns is nearing completion.

Energy Costs

The biggest factor currently influencing street lighting is the price of electricity. Over the last decade the cost of electricity has increased considerably and it is predicted that these prices will rise in the coming years. If the recent trend is to continue, the additional cost to the street lighting service will be significant.

In Figure 1.0 below, growth rates, between 5% and 10%, have been used to measure potential increases in electricity costs (based on today's consumption) over the next 20 years. If the projected energy cost increases are realised, the energy bill could increase significantly, from £4.66m in 2019/20 up to £8.26m in 6 years and as high as £28.5m in 20 years.

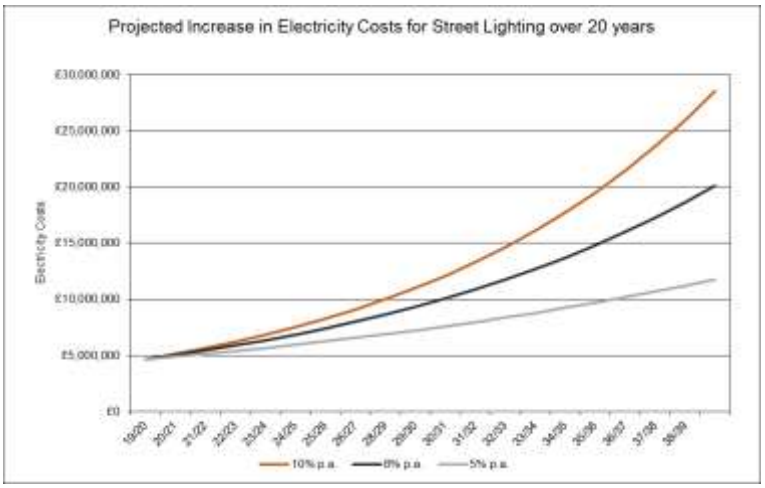


Figure 1.0 – Projected Increase in Electricity Costs for Street Lighting

Risk Management Strategy

Included within our Risk Management Strategy, Column Condition Assessments are carried out focusing on the types posing the highest risk. The highest priority columns for replacement are those with a known history of premature failure and those identified via the Operational and Strategic Condition Assessments. Columns identified as high risk will be assessed routinely until they are removed or replaced. All other lighting supports with an age that exceeds their design life will continue to be assessed on a regular basis. The outcomes from our strategic risk modelling is used to prioritise and inform future asset renewals.

Environmental Issues

The LED lanterns installed are using an average of 65% less energy. This is improving the efficiency of the lighting network and contributing towards the Council's corporate sustainability objectives by reducing carbon emissions and the aim of being one of the most sustainable cities in Europe.

Energy Efficiency

Over 70% of the remaining sodium lanterns (orange-coloured lamps) have exceeded their expected service life. The replacement of these lanterns is a high priority for future maintenance programmes as replacement lamps are no longer produced which will result in increased repair costs.

It is important to explore options for reducing street lighting energy usage that will protect the Council against predicted energy cost rises noted above. Additional costs are incurred as part of the Climate Change Levy which has recently replaced the Carbon Reduction Commitment charge. The lantern replacements using energy efficient LED lanterns will contribute towards delivering a reduction in energy usage and carbon emissions.

6.2 Asset Condition

Structural Columns

Glasgow's lighting infrastructure consists of various column types and is in poor condition with a significant proportion of the network beyond its Expected Service Life (ESL), with approximately 28,000 lighting columns exceeding their ESL.

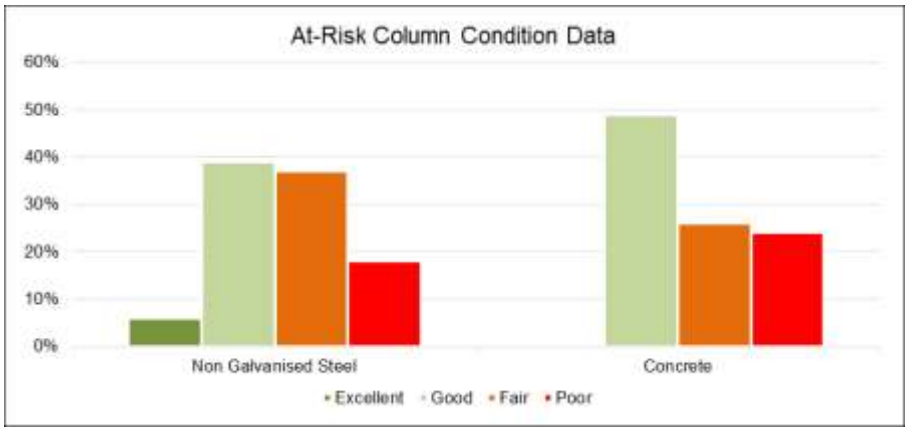


Figure 2.0 – Column Condition Data

Street Lighting Lanterns

Of the 72,250 lanterns we manage and maintain, approximately 45,500 are Sodium lanterns. The cost of maintaining these lanterns is expensive when compared to LEDs. It is anticipated that the cost of a sodium lantern will treble over the next 5 years. As costs continue to increase, consideration is being given to replacing all failed sodium lanterns with retrofit LED units. Sodium lanterns are replaced, on average, every 3 years, whereas LED units can last up to 15 years.

Cable Network

40% of Glasgow's lighting installations are serviced by ageing cable systems that require to be replaced and approximately 30% of the lighting network employs overhead cables. These overhead cables are known to contribute to the majority of section faults (dark streets). The deterioration of the cable insulation also increases the risk of electric shock.

An electrical inspection and testing programme of the lighting network is used to assist in influencing future asset renewals.

6.3 Lighting Investment Options

The investment scenarios below would address the highest risks associated with the ageing lighting assets following completion of the ongoing column renewal and LED projects. It should be noted that no allowance is made for inflation; forecasts are made at current market rates.

The lighting and electrical design associated with the column renewal projects are all undertaken using our in-house lighting design expertise.

The lighting renewal work will be procured on a competitive tendering process. The market for suitable contractors carrying out this work is relatively small and the projects will be phased to achieve good value for money in relation to whether suited to distributorship or manufacturer supply.

Investment Option 1: No Investment

If the assets beyond their expected service life are not replaced, the risk of injury by column collapse or exposure to electrical wiring will increase. Over 72% of lighting columns will exceed their expected service life by 2030. In the absence of a sustained renewal programmes the deterioration of our lighting assets will accelerate and lead to an ever-increasing number of network failures and reactive repairs.

30 Year Investment: £0m

Investment Option 2: Steady State

At present, 40% of Glasgow's street lighting assets are beyond their Expected Service Life (ESL). An annual investment of £5.23m is required to maintain the current condition of the asset.

30 Year Investment: £156.9m

Investment Option 3: Renew Columns at Risk of Structural Failure

An average investment of £10.4m for 5 years would replace up to 10,000 'at-risk' columns and associated cabling that are in poor condition followed by a steady state of £4.5m per annum for the next 25 years. This action will show an improvement in condition over 5 years, but if no further investment above steady state, then 35% of columns will exceed their service life after 20 years. The fitting of new LEDs for these columns would be included within the investment, providing the associated reductions in energy consumption and carbon emissions.

The benefit of this investment is a significant reduction in the risk of structural column failure and electric shock.

30 Year Investment: £164.5m

Investment Option 4: Replacement of Columns Exceeding Service Life

An average investment of £9.75m for 14 years would replace up to 28,000 'at-risk' columns and associated cabling which will result in a substantial improvement in infrastructure condition followed by a steady state of £3.3m per annum for the next 16 years. This will significantly reduce the risk of structural column failure and improve our column age profile by addressing the 28,000 columns that currently exceed their expected service life. This action will show an improvement in condition and approximately 8% of columns will exceed their service life after 20 years. The fitting of new LEDs for these columns would be included within the investment, providing the associated reductions in energy consumption and carbon emissions.

The benefit of this investment is an improvement and stabilisation of condition of the street lighting infrastructure, a significant reduction in the risk of structural column failure and electric shock, a reduction in reactive repairs and increased customer satisfaction.

30 Year Investment: £189.3m

Investment Option 5: Total LED Conversion by 2031

An average investment of £12.8m for 10 years offers an option to reduce the Council's street lighting carbon emissions by replacing all conventional lamps with energy efficient LED units to contribute towards the Council's target to be carbon neutral by 2030. This will involve a combination of retrofitting LED's to suitable existing installations and renewing old column installations.

This option would result in all of the City's street lighting being converted to LED's which would see a 65% reduction in energy consumption and over a 50% reduction in carbon emissions. After this, steady state funding of £3.3m per annum would be required to maintain the asset in its current condition.

10 Year Investment: £128m (for comparison 30 Year Investment: £194m)

Investment Option 6: Retrofit LED Conversion

An investment of £2m for 3 years would replace approximately 12,000 lanterns throughout the City that are suitable for lantern upgrade without the need to renew columns or associated cabling.

This option would result in 40% of the City being lit by LEDs which would see 65% reductions in energy consumption for these 12,000 lanterns, reduced carbon emissions and a significant decrease in reactive and cyclic repairs. However, this would not address the risk of structural column failure.

3 Year Investment: £6m

Summary

The age of Glasgow's lighting network is a significant issue as the deteriorating condition of the infrastructure poses an increasing risk to public safety. This remains a concern as there are approximately 28,000 lighting columns that have exceeded their expected service life. There is a need for increased investment as the existing levels on infrastructure improvements do not address the ageing profile of the lighting assets.

Options 3 and 4 may offer the most realistic approach available within workloads and risks, although consideration must be given to substantial investment over the next 5 to 10 years, if possible, in an effort to address the continual deteriorating condition of Glasgow's street lighting network.

Alternative investment models for the street lighting replacement/renewal programme, should also be investigated with a view to improving, in the short term, the overall column condition and associated cabling within the city to reduce the risks further.

7.0 Traffic Signals

7.1 Asset Overview

The Traffic Management System (TMS) asset is comprised of poles, cables, traffic signal lanterns and controllers infrastructure at junctions and pedestrian crossings. TRAFFCOM is the Council's traffic control centre that manages the 889 signal controlled junctions and crossings within the City.

Impact of Recent Investment

Recent investment of £800,000 in 2019/20 allowed for the replacement of 4 junctions and 7 pedestrian crossings in poor condition including the refurbishment of the complex junctions at Knightswood Cross and at Dumbreck Road. One pedestrian crossing was also upgraded using the Traffic Signals revenue budget.

In addition, Glasgow City Council received £600,000 from the Scottish Government Low Emission Zones grant which has allowed for the improvement of the traffic signals and control systems at Hurlet Cross and the junction of Bearsden Road and Islay Avenue.

Procuring and Sustaining Non-LED Stock

Most traffic signals contain incandescent 'wait' lamps that incur higher energy costs, are less environmentally friendly and are becoming increasingly difficult to source.

An upgrade of the wait lamp unit is possible, however, the estimated cost to complete this retrofit would be £180,000. An LED replacement programme would improve the quality and efficiency of traffic signals, with the replacement cost offset by reduced energy and maintenance costs.

Variable Message Signs (VMS)

There are 5 strategic VMS signs on arterial routes into the City that can be configured to display key travel information to motorists. The VMS signs are coming to the end of their serviceable life and spare parts are becoming increasingly difficult to source. A new VMS is approximately £25-35k, but depends on the size of the sign and the civil works involved. The increase and improvement in vehicle technology will likely see VMS signs become obsolete in the near future.

Disability Discrimination

The Equality Act 2010 places a duty on the Council to make reasonable adjustments for people with disabilities to help them to overcome barriers they may face when using road infrastructure assets. Upgrading traffic signal junctions improves mobility, accessibility and safety to Glasgow's most vulnerable citizens through the installation of compliant tactile paving and coning.

Traffic signals, tactile cones and tactile paving are essential to allow visually impaired citizens and visitors to the city to navigate junctions and pedestrian crossings. There are 195 sites without tactile paving and 181 without tactile cones.

COVID-19 Implications

The traffic signal maintenance contract was due for renewal on 1 August 2020. However, due to the COVID-19 pandemic, the existing contract was extended for a period of six months. The tender process has now been completed with a new contract start date of 1 February 2021.

7.2 Asset Condition

Traffic signal condition monitoring is carried out as part of the current maintenance contract. Our traffic signal maintenance contractor allocates the main items of equipment (controller, poles, cabling and signal heads) a scoring from 1 to 5 based on condition, with 1 being recently installed and 5 being old and in need of replacement.

Condition surveys show that the percentage of the asset in need for replacement has increased from 34% in 2016 to 53% in 2020. Of this, 19% are currently in poor condition and need replacement in the short term.

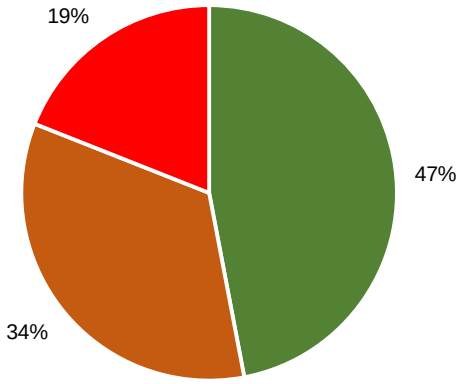


Figure 1.0 – Traffic Signal Condition

In addition, pedestrian push buttons are installed at both junctions and pedestrian crossings. Their condition is not scored at the present time, however, they are inspected as part of the twice yearly inspections. It is the intention to include this into the next Traffic Signal Maintenance Contract.

The deterioration of the traffic signal infrastructure is reflected in the increasing number of faults reported since 2015. It should be noted that the 2020 projection for the number of faults does not take reduced reporting during the COVID-19 pandemic into account.

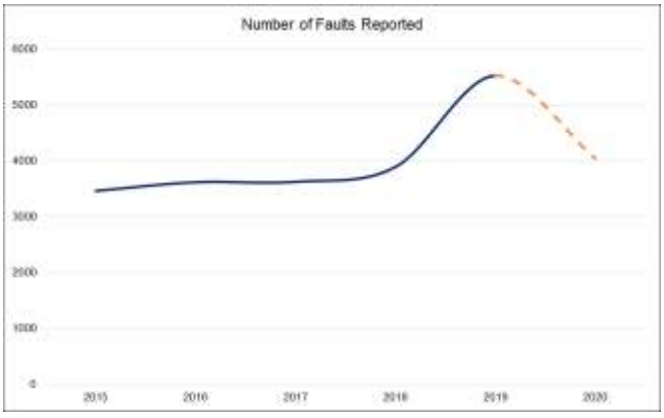


Figure 2.0 – Number of Traffic Signal Faults Reported

7.3 Traffic Signal Investment Options

Recent levels of investment are not sufficient to arrest deterioration. Sustained investment is required to address the poor condition of these assets, reduce cyclic maintenance costs and improve energy efficiencies.

Investment Option 1: No Investment

No investment would see a significant deterioration in the condition of the traffic signal infrastructure. This would result in an immediate risk to road safety and increased network disruption, with the number of faults reported increasing considerably.

Investment Option 2: Steady State

An annual investment of £3.7m is required to maintain the steady state condition of these assets.

Investment Option 3: Current Level of Investment

There is no additional capital investment for the 2020/21 financial year, however, over the previous two years there has been capital funding of £700k and £800k which has allowed the upgrade of the traffic signals in the most urgent need of replacement.

Our models indicate that with an investment of £800k per annum it would require approximately 28 years to bring the traffic signal infrastructure to the required standards. This level of investment would not address the potential risk of road safety or increased network disruption.

Investment Option 4: Upgrade all Remaining Sites to LED and Equality Act 2010 Compliance

An investment of £4.6m for 5 years is required to address the risk of traffic signal lamps becoming unavailable and bring all signalised junctions to the current standards in the Equality Act 2010. Improvements would include the upgrade of all traffic signals to LED and the installation of tactile paving at all junctions and pedestrian crossings.

This option would result in reduced maintenance costs once all traffic signals had been converted. It is aligned with Glasgow's sustainability objectives as it would improve the safety and accessibility for visually impaired and vulnerable users.

8.0 Traffic Signs, Lines & Street Furniture

8.1 Asset Overview

Glasgow City Council is responsible for the maintenance of over 24,000 traffic signs, 20,000 bollards, 110km of pedestrian barrier, 15.3km of vehicle safety barrier and approximately 5700km of road markings that improve the safety and usability of the road network. Additional street furniture such as seating, grit bins and bus shelters is also included within this asset group.

Current investment of £490k per annum only allows for the reactive maintenance of these assets and repairs are carried out when assets are no longer fit for purpose or to mitigate the risk to public safety.

Impact of Recent Investment

A £100k programme is currently underway that focusses on the repair of 0.7km of vehicle safety barrier that is no longer fit for purpose to ensure safer high-speed roads.

8.2 Asset Condition

The most recent condition surveys indicate that the majority of the street furniture asset is in a safe and serviceable condition with 98% of pedestrian barriers, 98% of bollards, 96% of traffic signs and 99% of vehicle safety barriers in good condition.

Road markings are a vital asset that improve road safety and facilitates enforcement; however, only 80% of road markings in the City are in good condition.

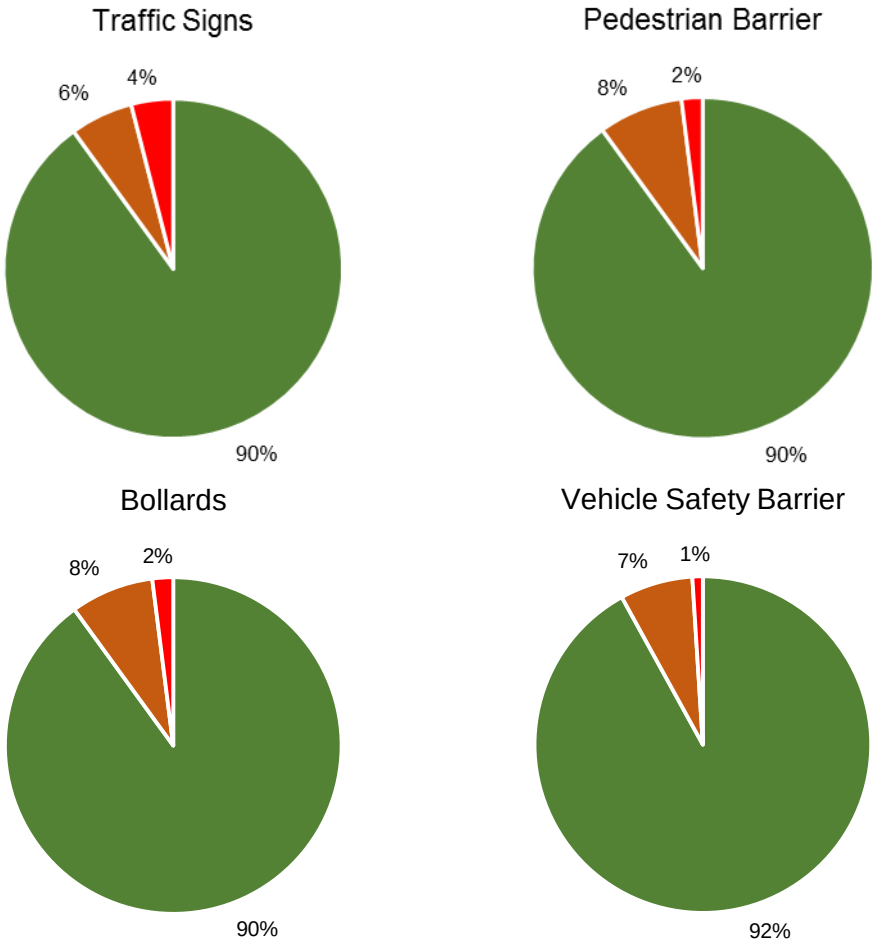


Figure 1.0 – Asset Condition

8.3 Traffic Signs, Lines & Street Furniture Investment Options

Increased and sustained investment would proactively target assets beyond or nearing the end of their useful life, improve asset condition and reduce ongoing maintenance costs.

Investment Option: Repair Assets in Need of Renewal

The continuation of the current capital investment of £100k over a sustained period of 16 years would repair or replace all street furniture identified as being in poor condition, including; 960 traffic signs, 2.2km of pedestrian barrier and 400 bollards. This investment will improve road safety and remove unsightly road furniture.

9.0 Structures

9.1 Asset Overview

Glasgow City Council is responsible for maintaining and managing 395 structures throughout the City.

These include listed structures, such as the Albert Bridge, old masonry arch bridges such as Snuff Mill in Langside and modern iconic structures such as the Clyde Arc. All have differing maintenance requirements dependent upon their structural type and condition.

Glasgow's structures connect communities and ensure commerce allowing citizens and business easy access across rivers, railways and roads ensuring efficient travel and transportation.

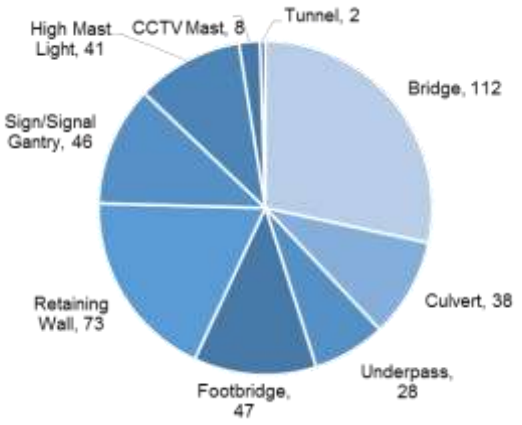


Figure 1.0 – Structures Asset

Impact of Recent Investment

Within the last year planned maintenance works were greatly impacted by the COVID-19 pandemic and therefore no major projects have been completed. Numerous investigations and smaller repair and strengthening schemes are underway on the highest priority bridges to improve the condition of the asset.

Structural Assessments

A strength assessment programme has been ongoing since the 1990s. 20 Council owned/maintained bridges failed the strength assessment in addition to 63 privately owned bridges, mostly owned by Network Rail. These bridges either have weight restrictions or interim measures in place, such as vehicle containment barriers to direct traffic to stronger areas of the bridge.

Network Rail Structures – Shields Road Bridge

Legislation passed, as part of the 1968 Transport Act, limits Network Rail's load bearing obligation to 1968 loading standards. Due to this, Glasgow City Council has a liability to contribute to the cost of strengthening, or replacing, Network Rail owned bridges which form part of the public road network.

The Shields Road Bridge (owned by Network Rail) is located over the railway between Scotland Street and St Andrews Drive and has been identified by Network Rail as requiring replacement. Failure to contribute to the costs of these works could result in closure of the bridge. The replacement cost is estimated to be circa £6m and the Council is liable for a share of these costs if the bridge is to be replaced. The cost share is yet to be finalised, however, the Council will be liable for a significant contribution. At present this sits at 50%, circa £3m, of the cost of these works.

9.2 Asset Condition

There are two key Bridge Stock Condition Indicators (BSCI) used to measure and compare the condition of the Scottish Council Bridge stock. 'BSCI Average', is a measure of the overall condition of all the structures, and 'BSCI Critical' is a measure of the most deteriorated parts of the structures.

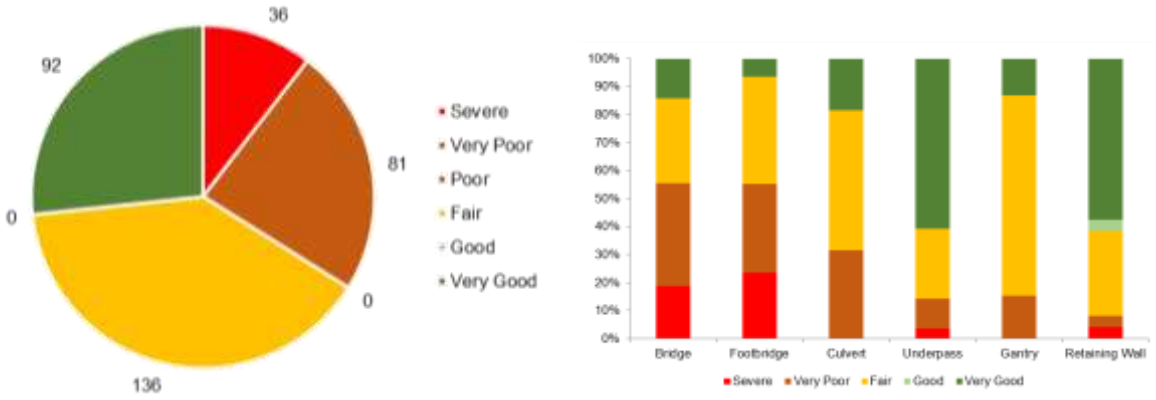


Figure 2.0 – Asset Condition

The Average Condition Indicator is 83. This equates to a condition rating of 'Fair' and sits within the third quartile, when compared with other the other Scottish Local Authorities.

Glasgow's Critical Condition Indicator is 67. This value equates to a rating of 'Poor Condition' and sits within the fourth quartile when compared with other Scottish Local Authorities. Structures in very poor condition or lower have been investigated and remedial works prioritised. This condition factor does not indicate that the structures are unsafe; it indicates there is a potential for deterioration in condition of an element, or elements, of the structure if maintenance works are not carried out.

Maintenance priorities are targeted to ensure structures are safe. Many structure cannot be fully refurbished due to lack of funding and this is reflected in our national ranking.

76 bridges and structures have been identified for future remedial programmes. The table below lists the top ten priorities.

1. Shieldhall Overpass Refurbishment	£4.77m
2. Edinburgh Rd Bridge o/rail Refurbishment	£480k
3. Edinburgh Rd o/dis Bridge Repairs	£240k
4. Eldon St Bridge o/dis Rail Repairs	£145k
5. Finnieston Overpass Refurbishment Phase 2	£2.2m
6. Brock Bridge (Braidcraft Rd) Repairs	£140k
7. Edmiston Dr Govan Bridge Repairs	£115k
8. Bellfield St Footbridge Replacement	£1.3m
9. Partick Bridge Parapet Repair	£105k
10. Sawmill Flyover Repairs	£35k

The top priority structure is Shieldhall Overpass. It is estimated that £4.77m is required to refurbish this structure. We are progressing the design of the concrete protection and repairs scheme. The design will be complete autumn 2020.

9.3 Structures Investment Options

It is estimated that £53m is required to strengthen weak bridges, upgrade vehicle restraint systems to current standards and address all maintenance needs identified during the cyclic inspections.

Investment Option 1: No Investment

In the absence of capital funding the Average and Critical Condition Indices will move towards very poor condition. The deterioration of these assets will accelerate until they become unsafe. In the short term there would be increase number of weight restrictions and lane closures. In the longer term bridges, and roads, would need to be closed.

Investment Option 2: Steady State Investment

In order to halt deterioration it is estimated that an annual investment of £3.6m is required. With this level of funding the overall condition would not deteriorate. Existing measures including weight restrictions and lane closures would remain.

Investment Option 3: Structure Repair Plan

In order to strengthen and repair the structures in the worst condition, an annual capital investment of £5.0m is required for the 20 year cycle. Medium & long term programmes would allow the removal of lane & weight restrictions throughout the city and improve the Bridge Stock Condition Indicators.

Investment Option 4: Structures Improvement Plan

To improve the condition and performance of the structures stock, including upgrading, would require an average annual capital investment of £6.4m over a 20-year period. Committing this level of investment would minimise whole life maintenance costs while prioritising the required levels of performance, i.e. removal of traffic restrictions from bridges across the network, and would shift and maintain the Critical Stock Condition to the ‘Fair’ condition category.

10.0 The Clyde Tunnel

10.1 Asset Overview

Strategic Importance

Glasgow City Council is responsible for the maintenance of the only road tunnel in Scotland. The Clyde Tunnel is the busiest stretch of non-trunk road in Scotland with approximately 64,000 vehicles using the Tunnel each day. An independent study* assessing the economic value of the Tunnel concluded that it has local, regional and national importance. It also concluded that, if the Tunnel was closed to vehicles, there would be an unacceptable severe impact on the movement of goods and people in the Clyde Valley affecting the viability of commerce, industry and tourism.

*study by Sinclair Knight Mertz & James Barr.

Grant Aided Expenditure

The operational funding for Clyde Tunnel funding is not properly accounted for in the Grant Aided Expenditure (GAE) formula. Glasgow City Council receives the same amount of funding as a similar length of local road. This funding takes no account of the need for the Tunnel to be staffed 24/7, the maintenance of the two tunnel bores and safety equipment, the maintenance of the two ventilation buildings, operational control room and the office block. The revenue funding shortfall is approximately £820k each year.

Traffic modelling of Clyde Tunnel closures is about to be undertaken. It is expected that the traffic data outputs will confirm significant delays to the trunk road network surrounding the Clyde Tunnel which would affect the economy of the region and risk of reputational damage. When the modelling report has been received, a meeting will be arranged with Transport Scotland and the Scottish Government to seek agreement of a suitable funding arrangement for the Clyde Tunnel to reduce the risk of it being closed due to insufficient investment.

Operational Requirements

There are strict regulations on the safety and management of road tunnels that require an operational workforce 24/7, 365 days a year. The workforce consists of one operations controller, one assistant operations controller, twelve network officers (three on shift at any one time) and one electrician.

Operational Safety

The Clyde Tunnel has a variety of operationally safety systems and equipment. This includes the CCTV system, which is an old proprietary system that is beyond its design life. The CCTV maintenance contractor has confirmed that there is a risk that spare parts will be discontinued and routine maintenance cannot be guaranteed going forward.

The Clyde Tunnel has no public address or radio re-broadcast systems. There is a risk that should there be a major incident within the Tunnel, the efficient and safe management of the evacuees could be compromised.

Scottish Power Energy Networks are upgrading the power supply to the Clyde Tunnel from 6.6KV to 11KV (High Voltage (HV)). This requires upgrading of the Clyde Tunnel's cabling, switch gear and sub stations. Also, a designated HV Authorised Person becomes a requirement. The HV upgrade works/authorised person will improve the resilience and future proof the electrical supply to the Clyde Tunnel. The HV upgrade works/authorised person is estimated to be £300K.

Recent Investment

£2.5m funding is secured for the LED lighting renewal of both bores of the Tunnel. At this time only 50% of the road Tunnel lighting is operational and it is not always possible to obtain the required spare parts to effect repairs. This major improvement work will provide modern energy efficient lighting that is compliant with current safety and design standards. It will also include the replacement of the old proprietary Supervisory Control and Data Acquisition system (SCADA).

10.2 Asset Condition

Structural Repairs & Cathodic Protection

Structural repairs and the replacement of the Tunnel's cathodic protection system are required. There is a risk that localised repairs will be needed to the reinforced concrete road deck which would lead to traffic congestion.

Operational Buildings

The outcome of a building condition survey carried out in 2015 concluded that the two ventilation buildings, operational control room and the office block require upgrading; structural repairs and remedial works are required so that they are wind and water tight (circa £2.3m). The condition of these operational buildings increases the risk of system failures that may require the Tunnel to be closed.

Property and Land Services (PALS) have obtained an updated estimate of £439k for the required roof repairs to the north and south ventilation buildings. Earlier this year, PALS completed refurbishment of the control room and office block. It is PALS's intention to include the roof repairs in a future work programme. These buildings would then be fit for purpose, with the risk of further damage mitigated.

CCTV AID & Public Address

A total investment of £200k, of which £50k has already been allocated, would allow for the replacement of the proprietary CCTV system which is beyond the end of its design life. A replacement CCTV Automated Incident Detection (AID) system would improve traffic management and the safety of the Tunnel. The CCTV AID would include fire, stationary vehicle, pedestrian on carriageway and 'stay in lane' functionality. The CCTV AID installation would include a public address and radio re-broadcast systems within both Tunnel bores and allow for efficient and safe management of evacuees.

Cycle & Pedestrian Ways

The existing wall mounted fluorescent compact lamp fittings are beyond their design life and the associated cabling does not comply with the electrical inspection and testing standard. In order to promote active travel and safe use of the cycle and pedestrian ways, the existing lamps and cabling should be replaced with energy efficient LEDs and new cabling.

10.3 Clyde Tunnel Investment Options

The Tunnel and its approaches require substantial capital investment. The table below summarises prioritised investment needs.

Clyde Tunnel	Estimate	Priority
CCTV AID	£0.15m	Very High
Traffic Modelling Study	£0.02m	Very High
HV Upgrade Works/Authorised Person	£0.30m	Very High
North & South Ventilation B/ding Roof Repairs	**£0.44m	High
Cathodic Protection & Concrete Repairs	£2.50m	High
LED/Cabling Replacement Cycle & Ped. Ways	£0.45m	High
Emergency Escape Route	£2.00m	Medium
Replace Electrical Installations	£0.65m	Low
Clyde Tunnel Approaches		
Shieldhall Overpass Strengthening	*£4.77m	High
Finnieston Overpass Refurbishment Phase 2	*£2.10m	Medium
Funding Secured		
CCTV AID/PA	£0.05m	Very High
LED Lighting & SCADA – Road Tunnel Bores	£2.5m	High

*These investment requirements are included within the Structures backlog figure (section 8).
**It is expected that this will be funded by PALS.

11.0 Ex GCC Housing Infrastructure

11.1 Maintenance Obligations

The roads infrastructure associated with the 2003 housing stock transfer to Glasgow Housing Association are not adopted as public and the Council has no statutory obligation under the Roads Scotland Act with regards to maintenance and replacement of these assets and consequently are not included in any safety inspection regime or considered for inclusion in investment programmes.

A number of these housing estates have been subsequently been subject of secondary transfers and are the responsibility of Local Housing Associations and due to a lack of investment, this infrastructure is generally in poor condition and requires extensive investment to bring it up to an acceptable standard.

A recent legal interpretation of the 2003 transfer agreement has determined that although not statutorily obliged to maintain these assets, The Council corporately does have contractual (under the terms of the agreement) and a wider duty of care (as land owner) obligations to ensure that these assets are safe and maintained to a reasonable standard. At present NS undertake reactive repairs to ensure that these assets remain safe however without planned investment these assets continue deteriorate and the requirement to undertake these repairs has increased resulting in dissatisfaction of residents, an increasing number of complaints and puts additional pressure on already stretched maintenance resources. It will not be feasible to continue to undertake these type of repairs forever and investment will be required to upgrade and replace these assets.

11.2 Scale of the Assets & Upgrade Costs

The roads infrastructure that serves the ex GCC Housing Estates is significant and comprises of approximately 44km of road (2% of existing network length) and 265km of footway and footpaths (8% of existing network length) a visual survey undertaken in 2015 estimated the cost to bring these roads and footpaths to acceptable standard to be in the region of £7m this is now likely to have increased.

A substantial lighting asset, estimated to be approximately 8,800 columns (12% of existing total), is also associated with the 2003 housing stock transfer. No condition data is available however in the absence of any investment it is likely that the majority of this will either have exceeded or be near to exceeding it's 30 year service life and will be in need of replacement. The cost to completely replace the lighting asset associated with the Stock Transfer is estimated to be £24m.

11.3 Summary

In the absence of significant investment to repair and upgrade these assets The Council is exposed to an ever increasing maintenance liability that is likely to increase year on year, the likelihood is that costs to undertake reactive repairs will increase, customer satisfaction will decrease and complaints, Member Enquiries and public liability claims will also increase. To try and mitigate these risks we are proposing to establish cross department working group to review how these assets are maintained and explore options and opportunities to attract additional funding.

12.0 Summary of Investment Options

Asset Group	Investment Option	Projected Outcome
Carriageways	£96m Over 5 Years	An annual investment of £19.2m for 5 years would lead to Glasgow road network being in the best condition in over a decade and the best roads in Scotland.
	£116.5m Over 5 Years	An annual investment of £23.3m for 5 years would lead to Glasgow's road network being comparable in condition to Scotland's trunk road network.
Footways	£17.1m Over 5 Years	An annual investment of £3.42m would remove all footways exhibiting major defects and structural deterioration.
	£30.7m Over 10 Years	An annual investment of £3.07m would remove all footways exhibiting major defects and structural deterioration.
Cycleways	£55k	An investment of £55k would enable the condition of the primary cycle network to be maintained.
Road Drainage Systems	£500k	An investment of £500k would enable identification, investigation and repair of all reoccurring road drainage defects throughout the City to continue.
Street Lighting	£52m Over 5 Years	An annual investment of £10.4m per year for 5 years will replace up to 10,000 'at-risk' columns and associated cabling in poor condition.
	£136.5m Over 14 Years	An annual investment of £9.75m per year for 14 years will replace up to 28,000 'at-risk' columns and associated cabling which would substantially improve the infrastructure condition.
	£128m Over 10 Years	An annual investment of £12.8m per year for 10 years will replace all conventional lamps with energy efficient LED units. This will involve a combination of retrofitting LED's to suitable existing installations and renewing old column installations.
	£6m Over 3 Years	An annual investment of £2m over 3 years would upgrade 12,000 lanterns to LED resulting in 40% of Glasgow's lighting network consisting of LED lanters.
Traffic Signals	£23m Over 5 Years	An investment of £4.6m per year for 5 years will convert all traffic signal junctions with old incandescent technology to LED's and the installation of tactile paving at all junctions and pedestrian crossings.
Traffic Signs, Lines and Street Furniture	£100k Over 16 years	An annual investment of £100k for 16 years would repair all traffic signs, lines and street furniture in urgent need of replacement.
Structures	£100m Over 20 Years	An annual investment of £5m over a 20 year period would allow for the structures in the worst condition to be targeted for repair.
	£128m Over 20 Years	An annual investment of £6.4m over a 20 year period would improve the condition and performance of the structures stock condition indicator.
Clyde Tunnel	£12.7m	An investment of £12.7m would allow for the repair of operational infrastructure and structural issues.