Annual Status and Options Report

Roads Infrastructure
November 2024

Executive Summary

The Annual Status and Options Report records the condition of our road assets and provides a means of identifying and prioritising the overall funding needs.

Investment in roads infrastructure is critical to achieving the outcomes and grand challenges set out in the Strategic Plan 2022 to 2027 as it supports the delivery of sustainable transport and travel, becoming a net zero carbon city and the creation of safe, clean and thriving neighbourhoods.

Asset Overview

Carriageways
1,924km

Footways
3,124km

Lighting
74,000 columns

Structures
395 structures

Traffic Signals
910 junctions

Cycleways
310km

Successes

- Glasgow continues to excel as one of the best-performing Road Authorities in the country, with 70.8% of carriageways in acceptable condition, compared to the Scottish average of 65.9%.
- Significant capital investment has been made in footways and cycleways through City Deal projects and active travel schemes throughout the City. Key projects include the Byres Road Avenue, Holland Street and Pitt Street Avenue, and the South City Way.
- Our neighbourhood gully programme has been hugely successful and has been well received where it has been delivered. These neighbourhoods have seen a reduction in flood reports, supporting resident mobility, whilst also improving the look and cleanliness of the local environment.
- Funding has been secured to replace approximately 9,000 of the poorest condition lighting columns and convert the outstanding 30,000 sodium lamps to LED.
- Ten junctions have been upgraded with funding from the Cycling, Walking, Safer Routes budget, improving pedestrian access, particularly for those with disabilities.
- The completion of the £29.5m Govan Partick Footbridge in September 2024 re-established the historic connection between Govan and Partick. The bridge is key to and complements public and private sector investments to develop the Clyde Waterfront Innovation Campus and the Water Row development at Yorkhill Quay.

Asset Condition

	Carriageways	Footways	Lighting	Structures	Traffic Signals	Cycleways
Good	71% ↓	81% –	23% ↓	49% ↑	48% ↑	94% –
Moderate	24% –	16% –	18% ↓	43% ↑	38% ↑	5% –
Poor	5% ↑	3% –	59% ↑	8% ↓	14% ↓	1% –

Key Investment Priorities

- Investment in our carriageway asset has been below the required steady state value of £12.7m per annum since 2013/14. Implementing a five year improvement plan with an investment of £13.95m per annum would reduce the percentage of carriageways needing attention to 25% or

less of the network. This condition could then be maintained for approximately £10.6m per year. Notably, the overall cost of the improvement plan is lower than that required to maintain the current steady state, making it a cost effective solution for enhancing our road network.

- The rapid expansion of the cycle network and its associated infrastructure brings new challenges, particularly due to the specialised maintenance and labour required. This new infrastructure requires increased inspection, maintenance and winter gritting along with specific plant and machinery to maintain it. The specialist routine and cyclic maintenance, including more frequent sweeping and gritting, along with the use of more expensive materials, places a significant strain on existing resources and revenue budgets. As the cycle network continues to grow, alongside the 17 schemes within the £115 million Avenues Project, it is essential to increase future revenue budgets to adequately address these maintenance needs.

- An increase in revenue investment from £750k to £1.4m per annum would enable us to maintain current service levels for gullies on flood and arterial routes, as well as sustain a two yearly cycle of the neighbourhood gully programme.

- Currently, 43% of Glasgow's street lighting columns are beyond their Expected Service Life, which poses an increasing risk to public safety. An investment of £5.98m per annum over five years would enable the replacement of up to 9,200 'category Type 4' columns and their associated cabling. This investment would directly address the high-risk columns, significantly reduce the likelihood of column failures, and upgrade the aging cable network that contributes to many outages.

- Approximately 52% of traffic signal installations have been identified as needing replacement. To mitigate the risk of traffic signal lamps becoming unavailable and to ensure all signalized junctions meet the current standards outlined in the Equality Act 2010, an investment of £5.5 million per annum for five years is necessary. This funding will enhance safety and accessibility at traffic junctions throughout the City.

- Current investment in signs, lines, and street furniture is limited to reactive maintenance, addressing repairs solely to mitigate the risk to public safety. An additional annual revenue investment of £125k would enable effective management of vehicle safety barriers damaged in road traffic accidents. Furthermore, a £2.9m investment over five years would facilitate the upgrade of all road markings, poles, and signs along the 20 bus corridors within the City, which would improve journey times for passengers and support the delivery of sustainable transport and travel.

- £4.3m of Capital funding has been secured for the repair of the Shieldhall Overpass, the top priority structure for repair in Glasgow. However, a further £3.4m is required before the works can commence to strengthen the bridge and remove the existing weight limit.

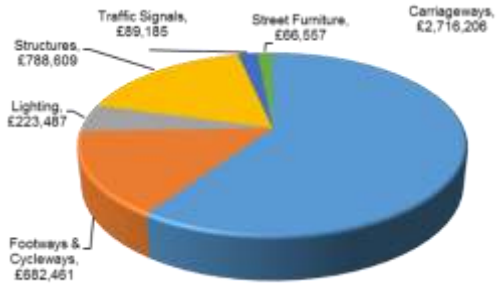
- The Clyde Tunnel and its approaches require significant investment to address necessary repairs to operational infrastructure and structural issues.

Contents

1.0 Introduction

The Annual Status and Options Report is a product of our Road Asset Management Plan. 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)

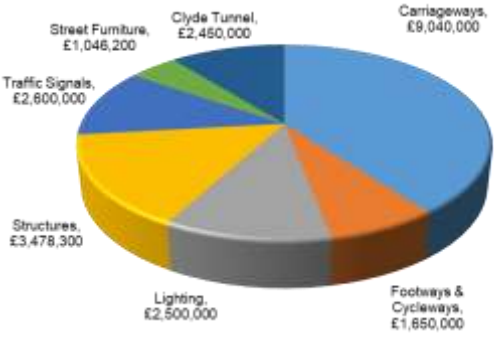
The level of investment required to maintain our roads infrastructure in its current condition (steady state) is estimated at £31.4m per year; this equates to an annual investment of 0.69% of the total asset value.

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

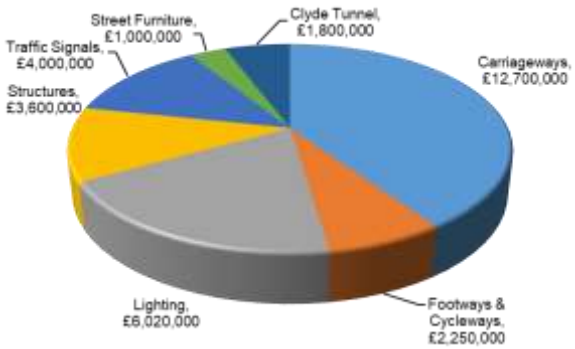
1. Asset Overview
2. Asset Condition
3. Investment Options

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's important to clarify that the current investment focuses solely on the additional budget allocation for the financial year aimed at enhancing the condition of the asset. This excludes cyclic or reactive revenue budgets, such as temporary pothole repairs, except for the budget related to street furniture.



Current Investment - £22.8m

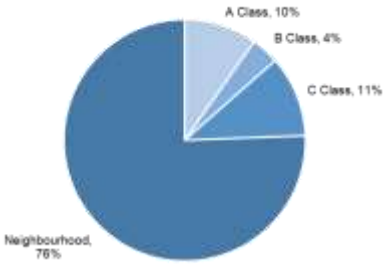


Steady State Investment - £31.4m

2.0 Carriageways

2.1 Asset Overview

Glasgow City Council is responsible for the management and maintenance of 1,924km of carriageways. Neighbourhood carriageways represent the majority of Glasgow's network (76%).



A Class	188km
B Class	72km
C Class	209km
Neighbourhood	1455km

Figure 1.0 – Carriageway Length

The latest data from the Scottish Road Maintenance Condition Survey (SRMCS) 2023 indicates that the condition of our carriageways has slightly deteriorated to 70.8% of our carriageways in acceptable condition. Despite this deterioration of 0.9% (the equivalent of 17km) Glasgow continues to be one of the best performing Road Authorities in the country when compared to the latest available Scottish average of 65.9% of carriageways in acceptable condition.

Customer Satisfaction

There is a direct correlation between customer satisfaction and public pothole reports. Extreme winter weather and more frequent summer rain events has a detrimental impact on the number of public pothole reports received and, therefore, customer satisfaction.

The latest data indicates that satisfaction with roads maintenance, which is measured by an annual household survey, has now fallen to the lowest level since 2011 (12%) whilst we saw a large increase in public pothole reports to over 21,000.

This can be attributed to the severe winter of 2020/21 and the sustained frost and freezing temperatures of winter 2022/23, which saw Glasgow have its coldest road surface temperatures since 2010.

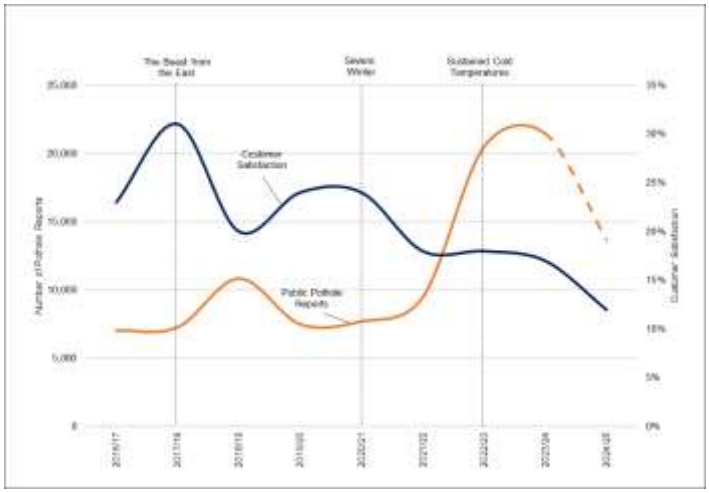


Figure 2.0 – Public Pothole Reports vs. Customer Satisfaction

Level of Investment

The primary cause for the increase in public pothole reports can be attributed to investment in the carriageway asset being continually under the £12.7m per annum that is required to maintain the carriageway in its existing condition. Allocated investment has not been above the steady state value since 2013/14. Sustained increased investment will provide greater network resilience and resistance to potholes.

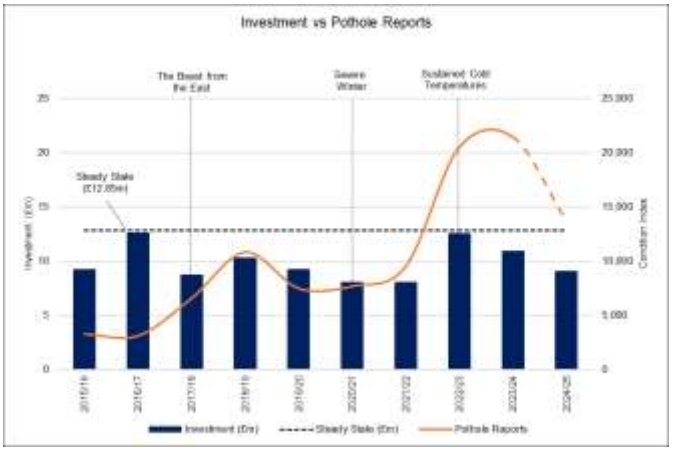


Figure 3.0 – Public Potholes Reports vs. Investment

Seasonal Risk

The impact of extreme winter and summer weather on the condition of our carriageways is clear. There remains a risk of structural deterioration and, in the event of subsequent bad winters, the number of potholes will increase significantly.

Targeted investment strategies after severe winters have previously helped to improve the level of customer satisfaction and reduce the number of public pothole reports, however, subsequent severe winters in 2017/18 and 2020/21 negatively impacted the carriageway network.

It should be noted that the impact of a severe winter, or sustained frost and freezing temperatures such as those experienced in winter 2022/23, is not realised immediately and an increase in public pothole reports should be expected approximately a year after the event.

2.2 Asset Condition

Road structural condition is measured by the Scottish Road Maintenance Condition Survey (SRMCS). The survey assesses parameters including; smoothness, rutting, surface texture and surface cracking, and is undertaken nationwide, allowing us to compare parameters against other Scottish Authorities. The parameters surveyed provides an indication of the integrity of the unseen road structure and a measure of the percentage of carriageways that should be considered for future maintenance treatment. However, it does not indicate the condition of the road surface condition or potholes and, therefore, there is likely to be a discrepancy between public perception of carriageways and the road structural condition shown below.

Figure 4.0 shows that whilst the structural condition of our carriageways has remained relatively steady since 2015/16 (between 69% and 71% of carriageways in acceptable condition), they have never recovered to the pre-2010 levels of above 75%, which were recorded prior to consecutive severe winters. As above, this can be attributed to continued, long term investment under steady state which has led to a managed decline in road condition that can be expected to continue unless investment increases.

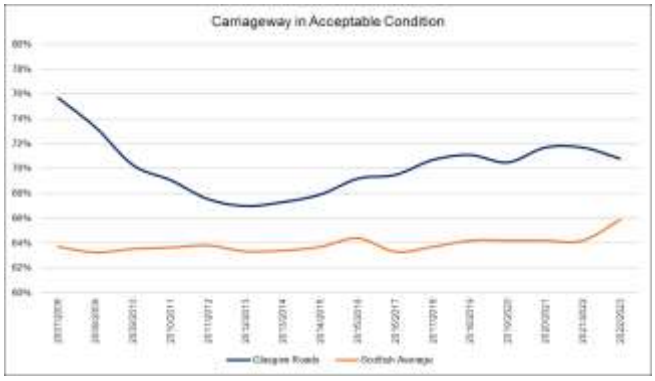
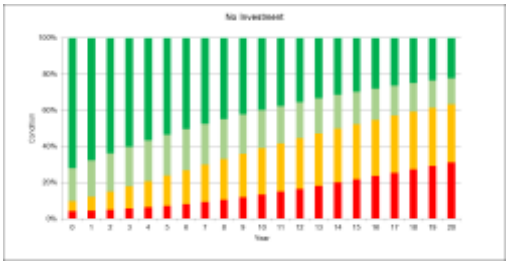


Figure 4.0 – Carriageway in Acceptable Condition

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 usually cannot be assessed in the short term. The investment options presented below consider the projected impact over a 20-year life cycle. This allows decisions to be taken with an understanding of medium and long-term implications.

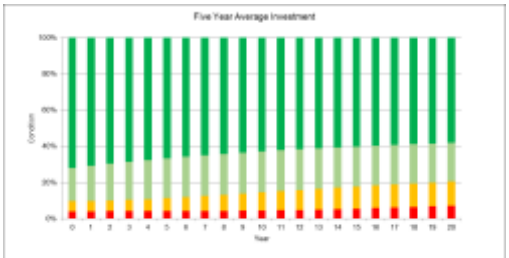
It is significant to note that the overall cost of the two Improvement Plans is less than the cost to preserve steady state. It is cheaper to intervene early in the material lifecycle than to wait until more extensive repairs are required and a fairly small increase in investment now, will save a substantial amount of money in the future.



Option 1 – No Investment

No investment in the carriageway asset would lead to severe deterioration, with 78% 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.

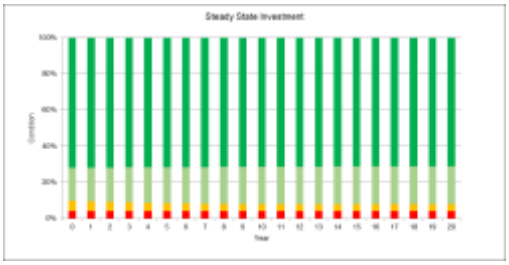
20 Year Investment - £0m



Option 2 – Five Year Average Investment

Continued investment at the previous five year average of £9.7m per annum would lead to a deterioration in the condition of the asset with approximately a further 13.9% or 267km of carriageways in poor condition after 20 years.

20 Year Investment - £194m



Option 3 – Steady State Investment

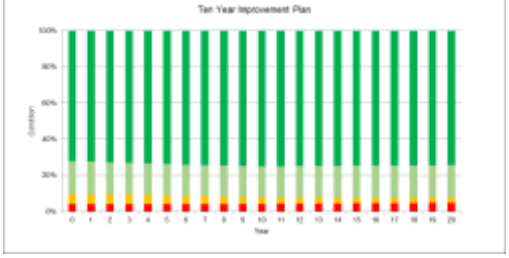
An annual investment of £12.7m is required to maintain the existing condition of our carriageways at 28% of carriageways requiring attention, with marginal improvement.

20 Year Investment - £257m

Option 4 – Five Year Improvement Plan

An annual investment of £13.95m over 5 years would reduce the percentage of carriageway requiring attention to 25% or less 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.

20 Year Investment - £229m



Option 5 – Ten Year Improvement Plan

An annual investment of £13.2m over 10 years would reduce the percentage of carriageway requiring attention to 23% of the network after 10 years – the best condition since 2006. This condition could then be maintained at this level for £11.1m per annum. It is key to note that both improvement plans offer better condition for less money than maintaining steady state.

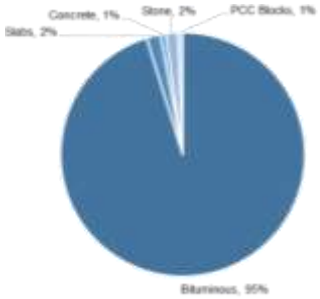
20 Year Investment - £243m

3.0 Active Travel Infrastructure

3.1 Footways Overview

3.11 Asset Overview

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

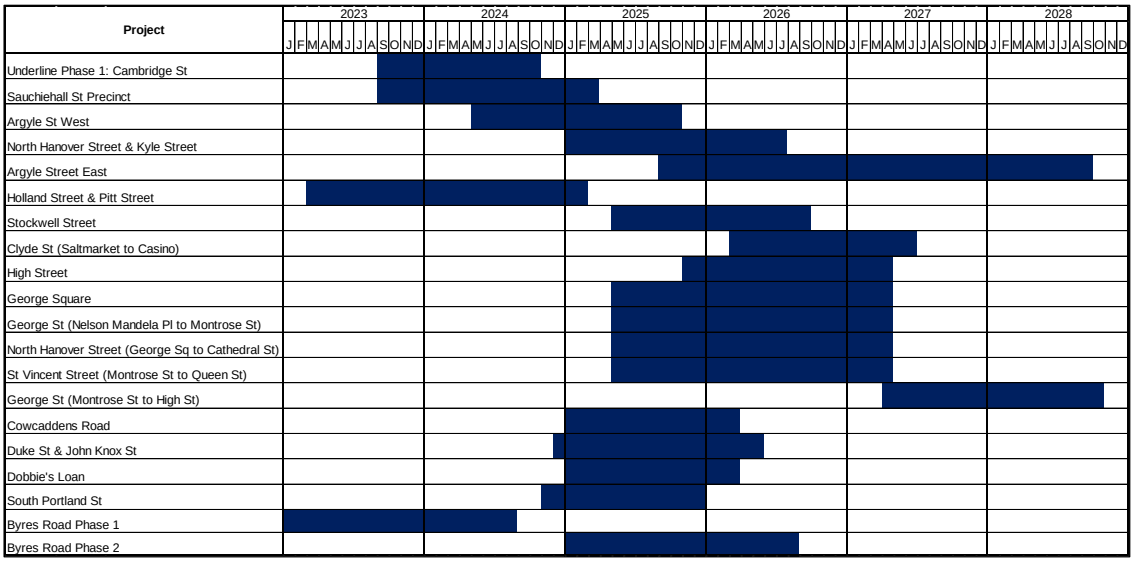


Bituminous	2974km
PCC Slabs	58km
Concrete	22km
Stone	51km
PCC Blocks	19km

Figure 5.0 – Footway Length

Impact of Recent Investment

Despite there being no specific allocated roads investment for footway works in 2023/24, there has continued to be a Capital investment in footways through City Deal projects and improvements made in conjunction with active travel schemes on key thoroughfares and transport links throughout the City. The below gives an overview of the ongoing Avenues programme as of Summer 2024;



Customer Satisfaction

Customer satisfaction with regards to the footway network, which is measured by an annual household survey, has generally fluctuated between 42% and 52% over the last ten years. This is attributed to previously sustained investment to maintain 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.

However, 2023/24 saw the lowest customer satisfaction level since 2010/11 (36%). This is attributed to weather conditions and under investment in the asset. With an allocated footway budget of £2.3m for 2024/25, in addition to a number of significant active travel and Avenues Project schemes, we anticipate that customer satisfaction will improve.

Dramatically increasing customer satisfaction of the footway network is difficult. For example, despite a major Capital investment of £5m completed in 2018, that focused on the improvement of highly pedestrianised neighbourhood thoroughfares, customer satisfaction levels did not increase.

Figure 6.0 – Customer Satisfaction

3.12 Asset Condition

The most recent footway condition data indicates that 87% of our footways are in either a good or fair condition. 0.4% (approximately 13km) of our footways exhibit major or structural deterioration and 12.6% (approximately 393km) exhibit minor deterioration such as cracking and oxidisation.

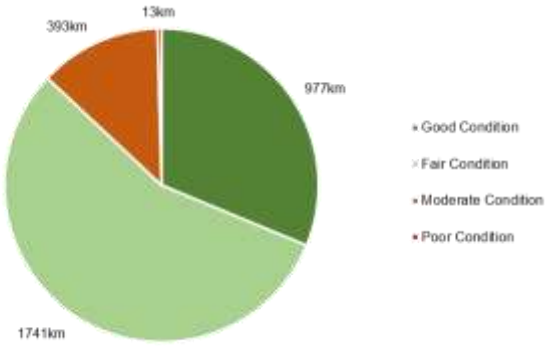


Figure 7.0 – Footway Condition

The above condition data is dervied from a recent survey of two multi-member wards, which has been upscaled to represent the entire footway asset. We intend to keep updating the assets condition through additional sample surveys and by recordng footway condition information in conjunction with walked safety inspection routes

The number of public injury claims is reflective of the condition of our footways and 2023/24 saw the highest number of footway claims settled since 2015/16.

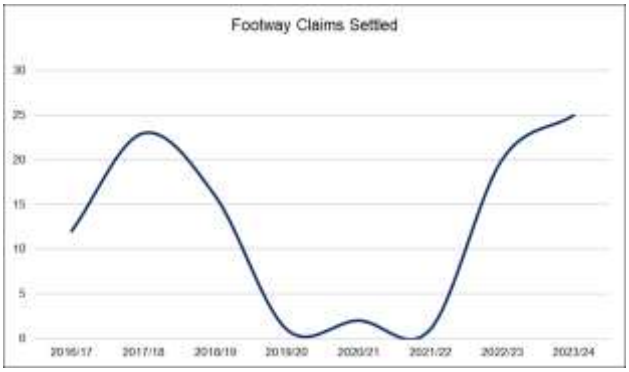
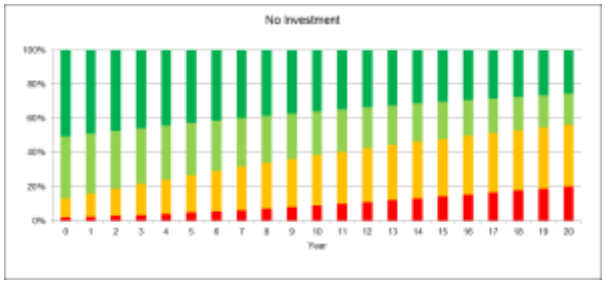


Figure 8.0 – Footway Claims Settled

3.13 Footway Investment Options

As our latest condition indicates that only 0.4% of our footways are in poor condition, the investment options below highlight the sustained level of investment required to maintain the condition of our footways.

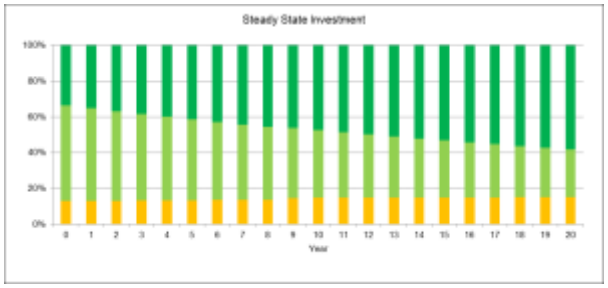
Additionally, public realm footways create high quality public spaces that, in addition to having a natural stone surface, include certain features, such as rain gardens and cycleways. These areas have a more aesthetically pleasing appearance as well as assisting with climate adaptation through the use of new drainage techniques. It is vital that existing revenue investment, such as the £350k public realm budget to repair loose and damaged slabs, is increased in line with the continued expansion and creation of these high quality public spaces.



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 Investment

An annual investment of £1.94m is required to maintain the existing condition of our footway network.

20 Year Investment - £38.8m

3.2 Cycleways

3.21 Asset Overview Cycleways

Glasgow's active travel network currently consists of approximately 310km 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 continuing to collect data to assist and inform future maintenance requirements. An assessment of the primary cycle network was undertaken in 2022. 61km of the primary cycle network is on the publicly adopted road network for which Glasgow City Council has a statutory duty to maintain.

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

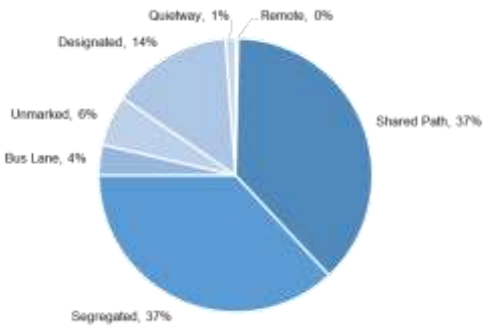


Figure 9.0 – Primary Cycle Network Length Maintained by GCC

Impact of Recent Investment

The recently adopted City Network Final Delivery Plan represents Glasgow's commitment to create a safe Citywide cycling network. Council Officers are progressing a range of projects to deliver on our City Network commitments.

Projects currently ongoing or due to commence in 2024/25 include those listed below, with greater detail provided in the table as part of Appendix 1.

- Connecting Woodside works to install cycle segregation at St Georges Road/Charing Cross
- Pitt Street Active Travel Link which are on site as part of the wider Holland Street Avenues project
- Connecting Battlefield works to install cycle segregation on strategic routes within Langside
- Connecting Yorkill and Kelvingrove works to prioritise cyclists and pedestrians to support sustainable and active transport travel choices
- North East Active Travel Route connecting the North East of the City to the City Centre.

3.22 Asset Condition

The condition data available at present for the cycle network only covers the 61km primary cycle network maintained by Glasgow City Council. This data indicates that 94% of the asset is in good or fair condition. This reflects the fact that much of this infrastructure is relatively new.

However, additional information from Sustrans Scotland's Walking and Cycling Index 2021, indicated that 42% of the public feel that their local area is a good place to cycle in. Additionally, 38% of the public stated that they feel safe cycling in their local area. Whilst these figures may appear low, in 2020, 23.5million cycling trips were made across Glasgow totalling 103.1 million miles. The developing City Network is an essential component for Glasgow in reducing carbon and promoting health and wellbeing.

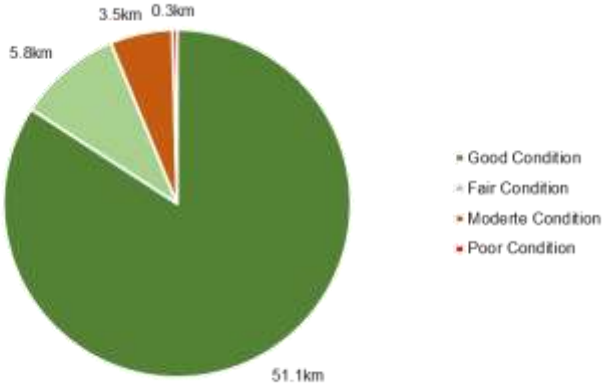


Figure 10.0 – Primary Cycle Network Condition

3.23 Cycleways Investment Options

The rapid expansion of the cycle network and the installation of associated infrastructure present new challenges, particularly due to the specialised maintenance and labour needed. The use of various materials to create a more aesthetically pleasing environment and provide a smoother ride has led to higher maintenance costs compared to standard bituminous surfaces. Public concern is evident, with a recent survey about the South City Way showing that 8% of respondents are worried about future routine maintenance.

This new infrastructure requires increased inspection, maintenance and winter gritting as well as different plant and machinery to maintain it. The specialist routine and cyclic maintenance, including more frequent sweeping and gritting, along with the use of more expensive materials, adds a significant burden to existing resources and revenue budgets.

As the cycle network continues to grow, alongside the 17 schemes within the £115 million Avenues Project and the expansion of public realm areas, it is essential to increase future revenue budgets to meet maintenance requirements.

Cycle Network Investment Option – New Infrastructure Maintenance Requirements

To effectively maintain the expanding cycle network, it's essential to explore different maintenance techniques, such as the joint funding initiative by Glasgow City Council and Sustrans for a multipurpose vehicle used for winter maintenance. Currently, this vehicle enables the maintenance of 25 km of segregated cycleway citywide. Although the vehicle costs £130,000, adding more units, optimizing routes, and expanding the network could reduce the unit cost to around £90,000.

However, to sustain this level of service as the cycle network grows, an increase in the annual revenue budget is necessary. Specifically, a dedicated annual investment of £80,000 is required to ensure effective gritting, sweeping, rain garden maintenance, and surface upkeep. Insufficient funding at this level could compromise the network's condition and limit the ability to perform cost-effective planned maintenance on its unique features.

Additional Revenue Investment - £80k per Annum

4.0 Road Drainage

4.1 Asset Overview

Our road drainage systems comprise of approximately 74,000 gullies (stanks), 2,500km of road drains, countless manholes, pumps, kerb drains and a variety of Sustainable Urban Drainage Systems (SUDS). These assets form an integral part of the public road and are a vital component in preventing costly damage to our road network, ensuring public safety on our roads and preventing property damage due to flooding.

Much of our drainage network was designed and installed in the late 19th or early to mid 20th century to cope with expected weather patterns of the time. Climate change and the predicted change to warmer wetter weather in Scotland is putting pressure on this asset group as we experience more frequent, more intense rainfall. During these events many of the flooding/apparent blocked gullies reported to us are actually due to lack of capacity in the sewer system to cope with the rainfall intensity being experienced.

It is recognised that flood risk and climate change continue to present a significant environmental risk to the City. Glasgow City Council is proactively working in partnership with key stakeholders in the Metropolitan Glasgow Strategic Drainage Partnership (MGSDP) to deliver a programme of drainage schemes targeting areas of the city where rainfall adversely impacts communities. These schemes will reduce flood risks and impacts on homes, businesses and travel corridors, improve water quality, bring greenspace improvements and increase drainage capacity. Increasing drainage capacity will allow land to be released for new homes and businesses, which supports continued economic development and regeneration across the city region.

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.

Impact of Recent Investment

Neighbourhood Gully Programme

The Council's neighbourhood gully programme has been hugely successful and customer satisfaction has been good where it has been delivered. These neighbourhoods have seen a reduction in flood reports supporting resident mobility and the look and cleanliness of the local environment is much better.

However, due to a number of factors, including breakdowns arising within the Council ageing gully vehicle fleet, driver shortages and lack of access due to parked cars, the programme for 2024/25 has suffered significant delay and completion of the programme in expected to be in excess of six months. This delay will have a knock-on effect to remaining neighbourhoods of the city that in are in this year's

programme, which is regularly updated on the Council's Gully Cleaning web page (https://www.glasgow.gov.uk/article/5112/Gully-Cleaning-Programme).

During the planned cleaning cycle data is collected and used to inform our understanding of the risk of flooding and blocked gullies in neighbourhoods. This information is used to inform the order of programme delivery.

Every street in the neighbourhood requires a temporary traffic regulation notices to be posted and hi-vis information signs erected. Neighbourhood co-ordinators advise community councils and residents groups so they can share the programme locally. Nightshift resources set out no parking cones and record any parked cars to allow Parking Attendants to enforce. Car lifters are deployed to move cars that are preventing access to gullies. Supervisory staff attend every day to co-ordinate gully cleaning and lifting of cars. All waste is collected and disposed by a SEPA licensed company.

As part of the current programme, in addition to gully cleaning, deep clean works are undertaken to sweep the road channels, scrape weeds, de-litter and collect leaves in Autumn. In those neighbourhoods where the gully cleaning programme has been delivered circa. 80% of the gullies have been successfully cleaned. The remaining gullies that are damaged, have underground blockages or broken pipe work are recorded and included in a risk based follow up programme.

The neighbourhoods visited this year were;

Area	Date of Completion	No. of Gullies Cleaned
Langside/Battlefield	Apr-23	1087
Springburn	Apr-23	1392
Springboig/Barlanark	May-23	1607
Temple/Anniesland	Jun-23	1561
Shawlands/Strathbungo	Jul-23	654
Pollokshaws/Mansewood	Aug-23	1258
Knightswood	Jun-23	1567
Ruchill/Possilpark	Nov-23	1409
Maryhill Rd Corridor	Nov-23	1020
North Maryhill/Summerston	Nov-23	1463
Yoker/Scotstoun	Dec-23	1154
Greater Gorbals	Apr-24	1261
Broomhill/Partick West	Mar-24	1107
Drumchapel	Mar-24	1557
Calton/Bridgeton	Mar-23	1117

In addition, all arterial routes were cleaned once and all flood routes were cleaned 3 times this year.

The Metropolitan Glasgow Strategic Drainage Partnership (MGSDP)

The complexity of flooding events requires a partnership approach. The development of Surface Water Management Plans (SWMP) for urban areas to reduce the impact of flooding is underway in Glasgow and is being carried out through the MGSDP. Glasgow City Council, Scottish Water, Scottish Government, SEPA and South Lanarkshire Council have been working together to tackle the issues of drainage and sewerage in the metropolitan Glasgow area since 2002, when the East End of the City suffered major flooding.

Several MGSDP City Deal projects to increase drainage capacity and reduce food risk were completed during 2023/24, including;

- Early Braes Park as part of the Garrowhill SWMP

- Penilee Park (Phase 2A)
- Queensland Gardens (Phase 3) of the Hillington/Cardonald SWMP

Detailed design work is continuing for the High Knightswood and Eastern Springburn SWMPs.

Sustainable Urban Drainage Systems (SUDS)

SUDS provide an environmentally friendly method to manage surface water and aim to control the flow, volume and frequency of surface water and prevent pollution by intercepting silt and runoff.

New SUDS infrastructure, such as; rain gardens, swales, basins, ponds or tree pits, have been installed as part of the expansion of the cycle network and the continued City Deal programme. This programme will continue to install SUDS across the City Centre as projects progress over the next two years.

This new infrastructure will help to reduce the impact of the more intense rainfall that we can expect but will require increased revenue budget in future to maintain its effectiveness.

We are monitoring the maintenance costs of early schemes to more accurately quantify the increased costs of maintenance and we expect to include this in the 2025/26 ASOR. Increased costs have been partially mitigated in the early years of the life of these projects by incorporating extended maintenance agreements into some contracts but as these contracts end, additional revenue budget will be needed to fill the funding gap.

4.2 Asset Condition

Glasgow's road drainage system is a historic asset with some infrastructure within Glasgow dating from the Victorian era. We maintain good records of the infrastructure which is visible on the surface but the below ground infrastructure such as pipes is not well recorded. There is no practicable method of retrospectively mapping below ground structure and condition is therefore assessed on a pass/fail basis. We pro-actively test and clean all gullies on our network at a pre-determined target frequency which will identify any that are not working or have sustained physical damage.

Performance indicators are regularly reviewed to help us to monitor the effectiveness of our cleaning regime and identify any hot spots that may require attention.

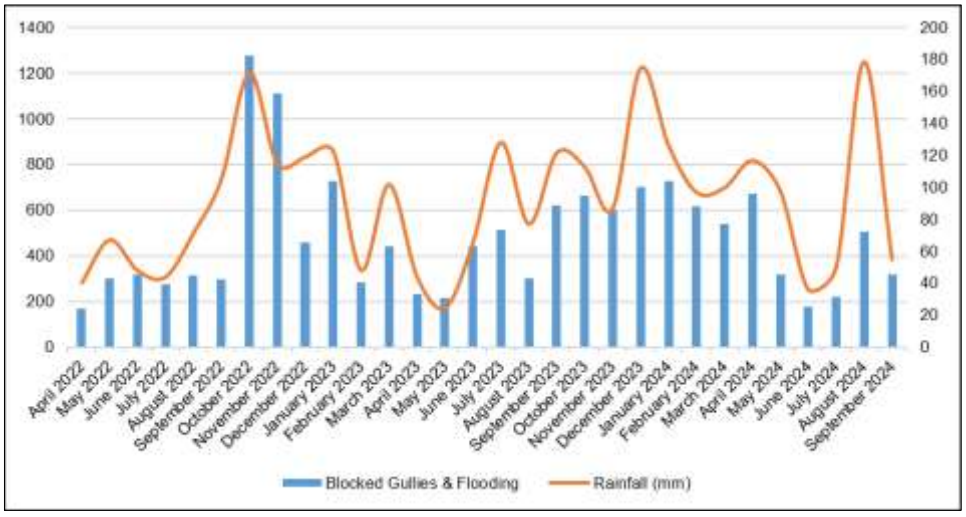


Figure 11.0 – Blocked Gully & Flood Reports

The chart above tracks rainfall against the number of blocked gully and flood reports that we receive. It is encouraging to note that the intense rainfall events experienced more recently have not resulted in such a sharp peak in blocked gully reports, as seen in 2022, perhaps indicating that our neighbourhood gully programme is starting to have an impact on the resilience of our drainage network. Rainfall this

year has, however, been higher than usual on average and has contributed to the number of flood reports received.

However, it should also be noted that floods are not always due to blocked gullies. During periods of intense rainfall the underlying capacity of the sewer network may be insufficient to cope with the volume of water and sewers may back up through the gullies. Seasonal leaf fall is also a common source of complaints when leaves clog up gully grates preventing floodwater from draining. This is an issue which can be greatly reduced with the assistance of the residents themselves by clearing leaves in the vicinity of their property and we are pleased to offer advice and assistance to any residents wishing more information and even basic equipment to do this.

The neighbourhood gully programme has been well received by communities as it's holistic approach to maintenance which includes gully cleaning and street sweeping results in an improvement to local street scenes.

4.3 Road Drainage Investment Options

Metropolitan Glasgow Strategic Drainage Partnership (MGSDP)

The forward programme of work to meet the MGSDP objectives includes;

- Camlachie Burn Phase 3 to desilt a section of culvert
- Drumchapel SWMP Phase 2A to form a new flood storage basin at Pitmilly Road
- Yokermains SWMP Phase 1 and Phase 2 to reduce the impact of flooding at Waldemar Road and Wykeham Road respectively.
- Glasgow City Council is also working in partnership with East Renfrewshire Council and SEPA on a Water Environment Fund project to improve the Capelrig / Auldhouse and Brock Burns.

This work is already funded.

Neighbourhood Gully Programme

It is now clear that issues caused by the volume of cars parked in the city was not fully understood and has adversely impacted the programme. Every day many parked cars need to be lifted to allow access to the gullies despite the comprehensive engagement process. This has caused the programme to be delayed and is major cost consideration. A review to align budgets to achievable service levels to take account of the additional organisational and operational requirements has been carried out to identify the required budgets to achieve a range of service levels. The existing revenue drainage budget used for gully maintenance is £750k per year and actual costs were used to calculate the service level in terms of the frequency of cleaning that we can afford to provide for different budget scenarios. In order to ensure that our main roads are protected, all investment options considered retain annual cleaning of gullies on arterial routes and 3 times yearly of locations known to be prone to flooding.

Investment Option 1 – Increased Revenue Budget of £1.4m per Annum

An increase in revenue investment to £1.4m per annum will deliver;

- cyclic maintenance of our flood and arterial gully routes to be carried out at existing frequency
- neighbourhood gully cleaning on a 2 yearly cycle

These frequencies of cleaning comply with the most widely accepted levels of service considered to reduce the risk of blockage and flooding. Levels of silt and detritus gathering in the gully pots will be cleaned out regularly reducing the risk of flooding, injury, property damage, and costly damage to the fabric and serviceability of our road network.

This is the recommended option.

Additional Revenue Investment - £1.4m per Annum

Investment Option 2 – Existing Budget of £750k per Annum

Maintaining the current revenue investment of £750k would deliver:

- cyclic maintenance of our flood and arterial gully routes to be carried out at existing frequency
- neighbourhood gully cleaning on a 5 year cycle

Although our arterial routes will be protected by maintaining the existing annual cleaning regime, the risk of blockage and flooding occurring in our neighbourhoods will be higher. More silt and debris will collect and cleaning will be more difficult and costly. The resilience of our road network to water damage will decrease, increasing the risk of accelerated damage to our roads and footways and consequential impact on road users and businesses due to vehicle damage and increased journey times. There will also be an increased risk to property from flooding and to personal safety.

This option is not recommended.

Investment Option 3 – Increased Revenue Budget of £1.1m per Annum

An increase in revenue investment to £1.1m per annum will deliver;

- cyclic maintenance of our flood and arterial gully routes to be carried out at existing frequency
- Nnighbourhood gully cleaning on a 3 yearly cycle

This represents a shift from our target 2 yearly cycle of gully cleaning to a 3 yearly cycle. The consequences of this will be similar in nature to option 2 but with a significantly reduced risk.

Additional Revenue Investment - £1.1m per Annum

Capital Investment for Repair/Improvement

Defects and damage that cannot be dealt with purely by gully cleaning are identified during the routine gully cleaning process. These defects are risk assessed and prioritised for action.

Between May 2022 and August 2024 we have cleaned 46,074 gullies and we currently have a backlog of 3,748 gullies/pipe infrastructure requiring follow up repair or replacement.

In order to address this, we propose to allocate the following sums from the Council's planned infrastructure capital investment for drainage repairs.

Year	2025/26 (£m)	2026/27 (£m)	2027/28 (£m)
Drainage Repair/Improvement	0.50	0.75	0.85

5.0 Lighting

5.1 Asset Overview

Glasgow City Council's Street Lighting network consists of over 74,000 lighting columns/supports and approximately 74,588 lanterns.

Impact of Recent Investment

Although the street lighting investment recently has been significant in comparison to the past, the current level of investment is still below the £6.02m per annum steady state figure required to maintain the infrastructure in its current condition. There is a need for increased investment as the existing levels on infrastructure improvements do not address the ageing profile of the lighting assets.

Notwithstanding the above, funding is in place to convert the remaining 30,000 sodium lamps to LED and replace approximately 9,000 of our poorest condition columns. Market engagement is ongoing to inform the delivery programme and it is hoped that this can be completed 31 March 2027.

This programme will focus on replacing columns that pose the greatest public risk on a priority basis, however, further funding is required to replace the associated cable network. The most cost efficient way of undertaking this work would be to replace the cabling when we are replacing the columns, negating additional mobilisation costs and minimising disruption to road users. This would ensure that the lighting asset is fit for the future, minimise the risk of electrical faults causing outages, mitigate the public safety risk associated with dark streets and reduce ongoing maintenance costs associated with fault repair attendance.

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 is currently approximately £5m over the available budget. If the recent trend is to continue, the additional cost to the street lighting service will be significant.

In Figure 14.0 below, growth rates, between 5% and 12%, 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 £8.08m in 2023/24 up to £69.6m in 20 years.

The energy costs are already rising and compared to last year, it would not be unreasonable to forecast that the figure could rise to £9.05m for 2024/25.

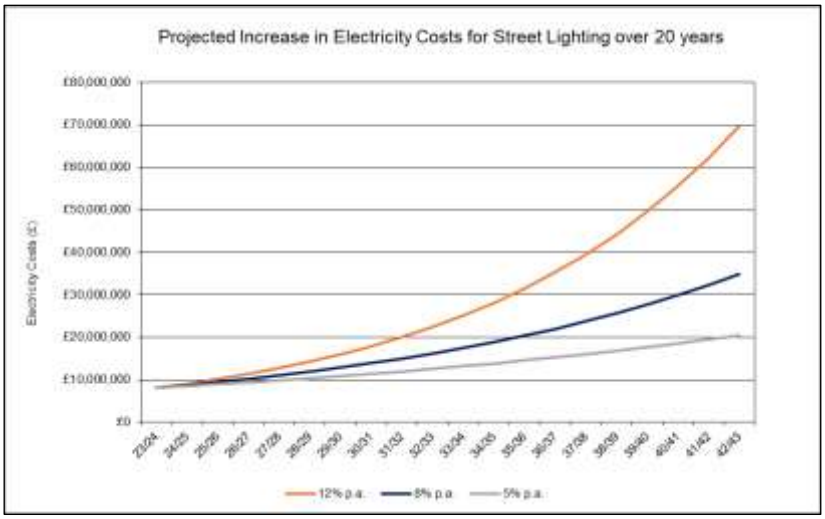


Figure 12.0 – Projected Increase in Electricity Costs for Street Lighting

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 80% of the remaining sodium lanterns (orange-coloured lamps) have exceeded their expected service life. As these lamp types are no longer produced our street lighting teams are now replacing any sodium lanterns that need changing with LED lanterns as standard.

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 also incurred as part of the Climate Change Levy.

5.2 Asset Condition

Structural Columns

Glasgow's lighting infrastructure consists of various column types and is in poor condition with approximately 31,900 lighting columns (43%) beyond their Expected Service Life (ESL). This is a significant issue as the deteriorating condition of the infrastructure poses an increasing risk to public safety which is currently being managed with the available funding.

In recent years, there has been a number of lighting column failures which are being addressed by investment in our column replacement programme. This programme aligns with our Risk Management Strategy and has been implemented to ensure those most at risk are prioritised for replacement.

The number of high-risk condition Type 4 columns identified has increased by approximately 14% in the last year to over 9,200. In response to this, the Council has reviewed the Risk Management Strategy and introduced a risk based approach to prioritising column replacements. We are also in the process of recruiting three dedicated Safety Inspectors, which will allow us to undertake an increased number of inspections to further mitigate the risk of column failure. To date, over 5,240 columns have been replaced as part of the ongoing replacement programme, however, a further 9,200 columns require to be replaced as soon as funding permits.

The roll out of LED lanterns has continued and there are approximately 45,000 LED units installed throughout Glasgow.

The photographs below are examples of Type 4, high risk condition columns (which have since been replaced).

The photographs below are an example of a Type 4 column that has been replaced (before and after photographs).

5.3 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.

Due to the condition of the existing street lighting, options 4 or 5 will offer a realistic approach to address the continual deterioration of Glasgow's street lighting network.

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 74% of lighting columns will exceed their expected service life by 2033. In the absence of a sustained renewal programmes the reduction of condition of our lighting assets will accelerate and lead to an ever-increasing number of network failures and reactive repairs.

30 Year Investment - £0m

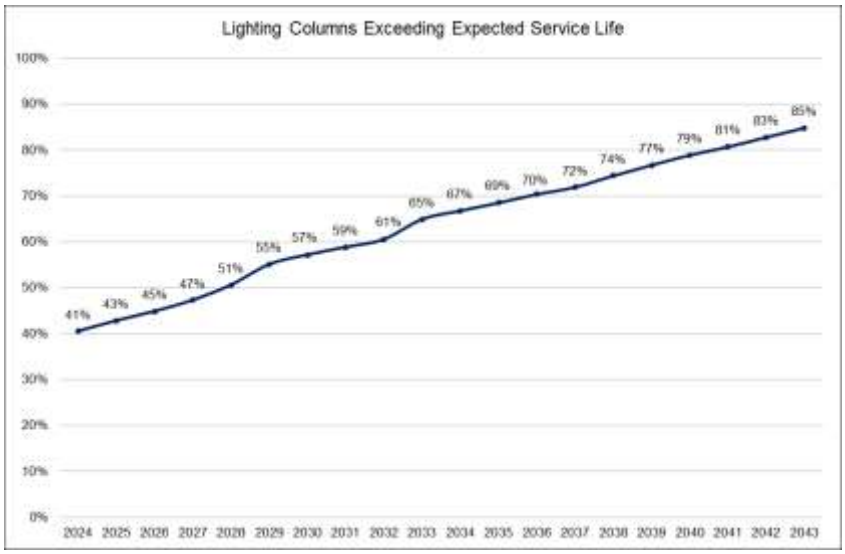


Figure 13.0 – Percentage of Lighting Columns Exceeding Expected Service Life

Investment Option 2: Current Level of Investment

If we continue at the current level of investment (£2.5m/year), the age profile of the columns will continue to deteriorate and the risk of injury by column collapse or exposure to electrical wiring will increase. Over 59% of lighting columns will exceed their expected service life by 2033.

30 Year Investment - £150m

Investment Option 3: Steady State Investment

At present, 43% of Glasgow's Street lighting assets are beyond their ESL. An annual investment of £6.02m is required to maintain the current condition of the asset.

30 Year Investment - £180.4m

Investment Option 4: Replacement of Columns with Condition Category Type 4

An average investment of £5.98m for 5 years would replace up to 9,200 'category Type 4' columns and associated cabling that are in poor condition, followed by a steady state of £5.25m per annum for the next 25 years. This investment will show an improvement in condition over 5 years,

The benefit of this investment is that it will address and replace the Type 4 high risk columns, significantly reduce the risk of column failure and upgrade the ageing cable network responsible for a large proportion of our outages. Although this option will significantly reduce the immediate risk of column failure posed by the current Type 4 Columns, further investment will be required in future to address current Type 2 and 3 columns that have exceeded their service life and will move into the Type 4 bracket as condition deteriorates over time.

30 Year Investment - £189.4m

Investment Option 5: Replacement of Columns Exceeding Service Life

An average investment of £6.93m for 15 years would replace up to 30,800 'at-risk' columns and associated cabling which will result in a substantial improvement in infrastructure condition followed by a steady state of £3.18m per annum for the next 15 years. This will significantly reduce the risk of structural column failure and improve our column age profile by addressing the columns that currently exceed their expected service life. This action will show an improvement in condition and approximately 34% of columns will exceed their service by 2038. 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. This would ensure our lighting asset is fit for the future.

30 Year Investment - £227m

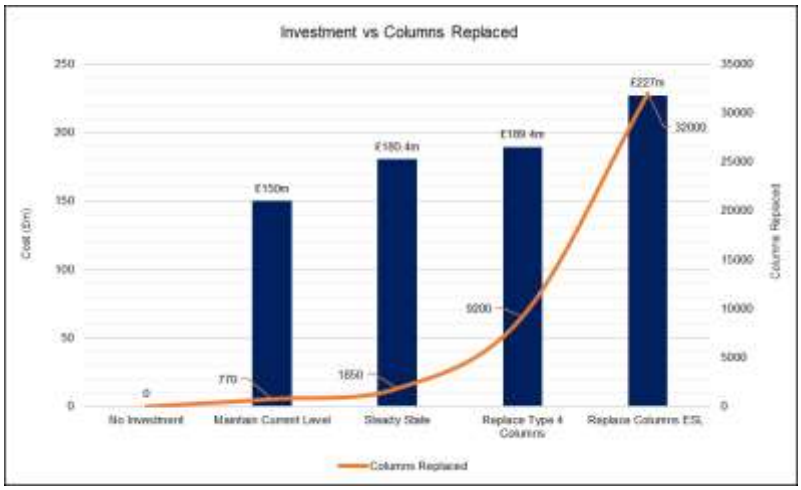


Figure 14.0 – Investment vs Columns Replaced

6.0 Traffic Signals

6.1 Asset Overview

Traffcom is the Council's traffic control centre that manages the intelligent transport systems within the City. This includes;

- 910 traffic signal-controlled junctions and crossings, comprised of; poles, cables, traffic signal lanterns, push buttons, detectors and controllers.
- A Urban Traffic Management Control (UTMC) system that includes; bus priority, which is installed at over 130 sites allowing the signals to detect late buses and adjust the traffic signal timings to help get them back on schedule, Split Cycle Offset Optimisation Technique (SCOOT), which is a real time adaptive traffic control system which deals with increased congestion and improves traffic flows and progression between junctions, remote access to allow changes to be made manually to the traffic signals to keep the transport links moving during events, emergencies and when incidents occur on the road network and fault management.
- 5 strategic Variable Message Signs (VMS) on arterial routes into the City that can be configured to display key travel information to motorists regarding events and incidents on the road network.

Impact of Recent Investment

People with disabilities face significant challenges when navigating city environments, particularly in the City Centre and key public transport areas. The Equality Act 2010 mandates that local councils make reasonable adjustments to eliminate barriers in road infrastructure. In Glasgow, upgrading traffic signal junctions enhances accessibility and safety for vulnerable citizens by incorporating features like tactile paving and improved junction layouts.

The Glasgow Transport Strategy (GTS) and related plans aim to enhance the transport network and promote active travel, focusing on inclusivity and reducing reliance on private cars. The Strategic Plan (2022-2027) emphasises combating climate change through sustainable transport while ensuring accessibility for those with disabilities. Key initiatives include;

1. Investing in pedestrian crossings to meet full accessibility standards.
2. Adopting an equalities approach to transport infrastructure maintenance.

Funding from the Cycling, Walking, Safer Routes (CWSR) budget has supported upgrades to ten traffic signal junctions, improving pedestrian access, particularly for those with disabilities. Additional funding has facilitated upgrades in deprived areas, enhancing access to schools and community resources. Collaboration with Community Councils and Elected Members has further expanded these efforts, leading to more accessible pedestrian facilities across the City.

6.2 Asset Condition

Over the years, declining investment in traffic signal maintenance has led to an increase in faults and obsolete equipment, with many sites surpassing their expected lifespan becoming harder to maintain.

Traffic signal condition monitoring is conducted as part of the maintenance inspection under the current contract, focusing on key components such as controllers, traffic signal poles, underground cabling, and signal heads. Each item is scored from 1 to 5, with 1 indicating good condition and 5 signifying that the equipment is obsolete, in poor condition, and requires replacement.

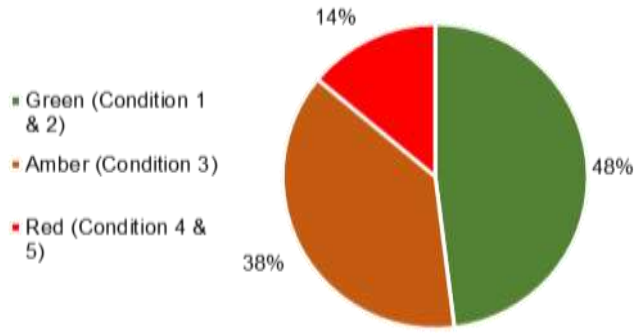


Figure 15.0 – Traffic Signal Condition

Monthly fault trend analysis has shown an increase in traffic signal faults during 2023, highlighting the challenges of managing an aging asset base and obsolete equipment. A significant issue is the ongoing crisis related to halogen lamps, which still account for 45% of the traffic signal network.

These older lamps not only incur higher energy costs but are also less environmentally friendly and increasingly hard to source due to manufacturing problems. Approximately 47% of traffic signal assets require upgrading, highlighting the urgent need for modernization.

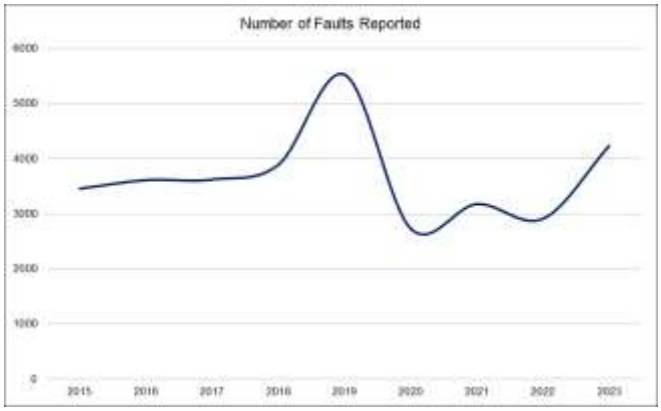


Figure 16.0 – Number of Traffic Signal Faults Reported

Variable Message Signs (VMS)

As part of the Road Safety Improvement bid, funding has been secured to replace five obsolete strategic message signs on the road network. Two of the original signs had stopped working, and parts from them were used to maintain the three remaining signs. The new signs are set to be installed before the end of the 2024/2025 financial year. They will convey important road safety and active travel messages while also collecting vehicle data such as speed and volume, integrating with Traffcom's traffic data platform. Additionally, the signs can display event information or alert drivers about incidents as needed.

Figure 17.0 – Existing Condition and Manufacturing Example of VMS

6.3 Traffic Signal Investment Options

Sustained investment is required to address the poor condition of these assets, reduce cyclic maintenance costs and improve energy efficiencies.

It is worth noting that the Contract Price Adjustment on the contract in January 2024 was 7.5%, this along with material costs increase and industry shortage for component parts will have a major impact on the delivery of projects within the funding limitations as our revenue funding remains the same every year.

Investment Option 1 – No Investment

Without investment, the traffic signal infrastructure will deteriorate significantly, leading to more faults and longer downtimes. This poses immediate risks to road safety for pedestrians, cyclists, and drivers, reducing safe crossing points and safe turning movements, including for public transport.

Network disruptions will increase, and the control room will lose the ability to adjust traffic signal timings in critical areas. Additionally, the number of faults will rise, with issues related to obsolete equipment and major cable failures, both of which are costly and time-consuming to repair.

Investment Option 2 – Current Investment

Capital investment for the 2023/24 financial year was £2.6m. Our models indicate that with an investment of £2.6m per annum, it would require approximately 11 years to bring the traffic signal infrastructure up to the required standards. This level of investment would not address the potential risk of road safety or increased network disruption.

Investment Option 3 – Steady State Investment

An annual investment of £4m is required to maintain and/or replace assets which are assessed as poor condition, but still serviceable.

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

An investment of £5.5m per year 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.

It should be noted that an increase in investment would also require an upscale of the resources within the team to cope with the design and management of projects.

5 Year Investment - £27.5m

Investment Option 5 – Tactile Cones and Tactile Paving

Traffic signals, tactile cones and tactile paving are essential to allow visually impaired pedestrians to navigate the city, have independence and use the junctions and pedestrian crossings. There are currently 129 sites without tactile paving and 83 sites without tactile cones.

Improvements would also include the upgrade of all traffic signals to LED. It should be noted that there is significant costs savings to be made if the traffic signal network was upgraded to LED as this would further reduce the Council's energy use, reduce CO2 emissions, reduce maintenance costs, and significantly improve traffic signal operations with a reduction of incidents of traffic signals not working due to failure of components.

Additional Investment - £11m

Investment Option 6 – Upgrade UTMC System

The existing UTMC system, operational since 2014, needs a full upgrade within five years to keep pace with industry changes and new technologies. Key components include bus priority systems at 130 junctions and SCOOT systems at 400 junctions. The current physical server is outdated and no longer supported. Minor improvements are underway to move the server within the next few weeks to a hosted system and this will enhance reliability and will keep the system running for the next five years.

A complete upgrade is necessary and would require an investment of £2 million or £1 million per year over two years, alongside a suitable contractor. The benefits of a new system include enhanced strategic network operations, potential for AI optimisation, improved journey time monitoring, incident management, pollution management and active travel optimisation.

Additional Investment - £2m

7.0 Traffic Signs, Lines & Street Furniture

7.1 Asset Overview

Glasgow City Council is responsible for the maintenance of;

- 24,000 traffic signs
- 20,000 bollards
- 110km of pedestrian barrier
- 5.3km of vehicle safety barrier
- 5,700km of road markings

All these assets 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.

Impact of Recent Investment

A £45k programme was completed that allowed for the repair of identified vehicle safety barrier and pedestrian guardrail on the Clydeside Expressway, Glenduffhill Road and Port Street that will reduce the severity of accidents and save lives.

Level of Investment

Current investment of £546k per annum only allows for reactive maintenance of these assets and repairs are carried out only to mitigate the risk to public safety. This level of investment is restrictive and does not allow for planned maintenance programmes to be developed and carried out.

For example, in 2024/25, 75% of the roads marking investment under the Roads Maintenance team (£96k) was required to be spent by August 2024 to replace worn and faded lining to mitigate the risk to public safety, therefore, resulting in extremely limited maintenance of road markings until the next financial year.

Bus Corridors

Our bus corridors require the refreshment of road markings and associated signage in order to enforce contraventions, reduce congestion and improve journey times for passengers which will support the delivery of sustainable transport and travel. Many of these corridors have not seen road markings refreshed for a significant number of years which has resulted in ongoing enforcement issues due to a lack of road markings and associated signage.

Parking attendants took part in a pilot scheme where they travelled on a number of bus services and noted all contraventions witnessed on these routes. The information on the bus corridors these services utilise, as well as number of contraventions noted are summarised below which make it clear that the journeys for passengers are heavily impacted by vehicles parking in contravention of regulatory restrictions.

Bus Corridor (Service)	Total Contraventions (Vehicle No.)
Maryhill Road (60/60a)	384
Great Western Road (6/6a)	322
Alexandra Parade/Cumbernauld Road (38/38a/38b/38c/38e)	314
Eglinton Street/Pollokshaws Road (38)	464
Paisley Road West (9/9a)	617

There are significant issues with missing/damaged regulatory signage on these corridors as many of the signs and associated poles were installed when some of these corridors were first introduced during 2003-2005.

These corridors play a key role in achieving the outcomes and grand challenges set out in the Strategic Plan and delivering reliable public transport services for Glasgow residents. It is vital they can be fully enforced in order to continue to improve passenger journey times and that they are well maintained in terms of regulatory road markings and signage.

7.2 Asset Condition

There is no accurate, up to date condition data available for the various street furniture and road marking assets. However, it can be assumed that the condition of the asset is deteriorating as reactive maintenance requirements are increasing.

Future condition assessments of this vast asset will be based upon sample data. In 2024 a survey was completed of two multi-member wards that captured traffic signs, lines and steert furniture asset inventory and condition data. This data is to be prorated to provide an estimate of condition for the full Council area.

7.3 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 – Vehicle Safety Barrier Maintenance Programme

An additional annual revenue investment of £125k would allow for the effective and efficient management of vehicle safety barrier damaged in road traffic accidents. At present, there is no separate, identified budget for this work and money has to be reallocated from other asset budgets.

Additional Revenue Investment - £125k per Annum

Investment Option – Bus Corridor Improvements

Based on the costs of the ongoing Paisley Road West corridor refresh and the costs to supply and install new poles and signage, it is estimated that £1.3m is required for road markings and £1.6m is required for poles and signs to bring all 20 bus corridors up to the required standard and to allow for regular enforcement. Due to the internal resources required to prepare up to standard drawings to be utilised by external contractors, as well as being able to source suitable external contractors, it would be recommended to deliver the above programme over a period of 5 years.

5 Year Investment - £2.9m

Investment Option – Repair Assets in Need of Renewal

An additional revenue investment of £100k over a sustained period would allow for the repair or replacement of all street furniture identified as being in poor condition, including traffic signs, pedestrian barrier and bollards. This investment will improve road safety and remove unsightly road furniture.

Additional Revenue Investment - £100k per Annum

8.0 Structures

8.1 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 (built 1871), old masonry arch bridges such as Snuff Mill footbridge (built 1730) in Langside and modern iconic structures such as the Clyde Arc (built 2006) and the Govan Partick Footbridge (built 2024). 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.

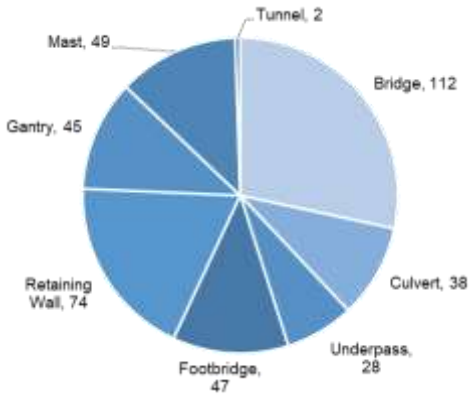


Figure 18.0 – Structures Asset

Impact of Recent Investment

Partick Bridge parapet was repaired last year. The bridge is a category B listed structure. The cast iron south parapet was tilting, and its fixings severely corroded. The full parapet was taken down and rebuilt with some panels being re-cast.

Glasgow City Council contributed £5m toward the total cost of £12.6m for the Shields Road Bridge replacement project. The bridge is owned by Network Rail and is located over the railway between Scotland Street and St Andrews Drive. The Council had an obligation to contribute to the replacement as it was widened to suit the Corporation of Glasgow in the 1930s. The works were necessary as the bridge was weak, in a very poor condition and the road would have to have been closed if further deterioration occurred. The road layout for vehicles passing over Shields Road was improved, reintroducing three lanes as well as a cycle lane over the carriageway, removing current restrictions. The bridge re-opened in August 2024.

Govan Partick Footbridge is a £29.5million Glasgow City Region City Deal project to re-establish the historic connection between Govan and Partick, with the bridge crossing between Water Row on the south side and Pointhouse Quay on the north. The Govan Partick Bridge is key to and complements public and private sector investments such as the £38million UK Government 'Strength In Places' funding to help the University of Glasgow develop the Clyde Waterfront Innovation Campus next to the Queen Elizabeth University Hospital, the Water Row (housing and commercial) development and proposals for more than 1,000 homes at Yorkhill Quay. The footbridge opened September 2024.

Targeted concrete repairs were carried out on sixteen bridges last year. Repairs treated bridges where important concrete members were in a severe condition. This programmed preventative maintenance will prolong the service life of the bridges.

Drainage clearance, de-vegetation and minor works to structures were carried out as routine maintenance improving serviceability and safety. 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 load assessment programme has been ongoing since the 1990s. 20 Council owned/maintained bridges failed the load 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 keep traffic to stronger areas of the bridge.

Expressway Road Gantries

The Council was advised of Transport Scotland's intention to terminate support of Intelligent Traffic Systems (ITS) equipment, such as CCTV and Variable Messaging Signs, on the non-trunk road gantries within Glasgow after their new Operations & Maintenance contracts commenced in March 2022. All ITS assets at the sites were subsequently removed in February 2023.

The gantries remained as these are the property of the Council and the active fibre communications and power networks are still in-situ for possible future use. The lack of gantry assets was of concern as there was an impact on road safety and traffic management on several critical roads of Glasgow's network.

The Council has investigated possible options for the gantries including condition repair and best methods for restoration of ITS functionality. A limited trial of nine temporary VMS was established on the Clydeside Expressway. The trial was successful, but if continued would incur costs of approximately £200k per annum. The knowledge gained highlighted that only four future VMS sites would be necessary for long term use.

8.2 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.

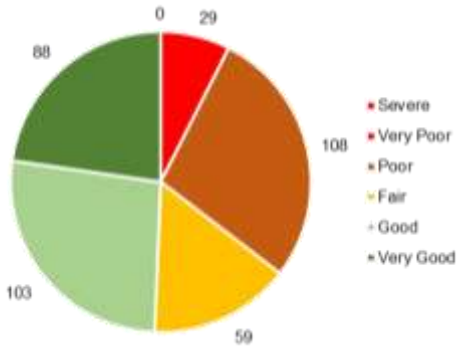


Figure 19.0 – Asset Condition

The Average Condition Indicator is 83. This equates to a condition rating of 'good'.

Glasgow's Critical Condition Indicator is 57. This value equates to a rating of 'poor'. 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 structures cannot be fully refurbished due to lack of funding and this is reflected in the condition indicator figures.

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

1. Shieldhall Overpass Refurbishment	£7.4m
2. Edinburgh Rd Bridge o/rail Refurbishment	£620k
3. Edinburgh Rd o/dis Bridge Repairs	£315k
4. Eldon St Bridge o/dis Rail	£150k
5. Dumbarton Road o/dis Rail	£150k
6. Cathcart Road (E&W) Footbridge Refurbishment	£100k
7. Edmiston Drive Govan Bridge Repairs	£150k
8. Bellfield St Footbridge Replacement	£1.7m
9. Dumbarton Road Bridge o/tunnel Approaches Parapet Upgrade	£150k
10. Finnieston Overpass Refurbishment Phase 2	£2.8m

The top priority structure is Shieldhall Overpass. This bridge was opened in 1966 on the southern approach to the Clyde Tunnel and carries A739 Clyde Tunnel Expressway over A8 Shieldhall Road. The overpass is heavily trafficked and is vital to the transport network as it links the tunnel to the southwest of the city, Glasgow Airport and M8 traffic to the Queen Elizabeth University Hospital and areas north of the river.

The structure is in very poor condition with extensive concrete spalling and exposed corroded reinforcement. A bridge load assessment resulted in a 7.5 tonne weight limit being put in place in January 2013.

A project to add a Cathodic Protection System, and repair the reinforced concrete piers is underway. Cathodic protection protects steel reinforcement from corrosion by running an electric current through it. This will strengthen the bridge and remove the weight limit. The design is complete, and the works contract documentation is near completion

£4.3m of Capital funding has been secured, however this falls short of the current constructed cost estimate of £7.4m. Providing the remaining £3.4m is secured, the works commencing summer 2025.

8.3 Structures Investment Options

It is estimated that £52m is required to strengthen weak bridges, upgrade parapets to current standards and address all maintenance needs identified during the cyclic inspections.

The investment options below are based on the whole structures stock. Individual structures assets vary greatly in size and value from retaining walls on the Clydeside Expressway with a depreciated replacement cost of £18k to £102m for George V Bridge. Their maintenance needs vary accordingly, and some years larger sums are required for larger projects.

Investment Option 1 – No Investment

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

20 Year Investment - £0m

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. It should be noted that this would be an average annual investment over the 20 year cycle as the spend profile would fluctuate year on year dependant on the nature of the works and structures being repaired.

20 Year Investment - £72m

Investment Option 3 – Structure Repair Plan

In order to strengthen and repair the structures in the worst condition, an annual investment of £4.5m is required for the 20 year cycle. Medium and long term programmes would allow the removal of lane & weight restrictions throughout the city and improve the Bridge Stock Condition Indicators.

20 Year Investment - £90m

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 £6.2m 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 the structures to a stable 'fair' condition.

20 Year Investment - £124m

Investment Option 5 – Shieldhall Overpass

The top priority structure for repair is the Shieldhall Overpass which is in very poor condition with a 7.5 tonne weight limit currently in force. It is planned to add a Cathodic Protection System and repair the reinforced concrete piers. Cathodic protection protects steel reinforcement from corrosion by running an electric current through it which will strengthen the bridge and remove the weight limit. The design is complete and the works contract documentation is near completion.

£4.3m of Capital funding has been secured, however, a further £3.4m is required before the works can commence.

Additional Investment - £3.4m

Investment Option 6 – Expressway Road Gantries

To provide essential driver safety information on the Clydeside Expressway, it is recommended that four gantry sites are upgraded. Also, several of the gantries require substantial capital investment to repair the basic structure and restore ITS functionality. The table below summarises prioritised investment needs;

Expressway Gantries (Priority = Red/Amber/Green)	**Estimate (£M)**
Structural gantry repair to support ITS Equipment	1.5
ITS Lane/Speed Control, counters & VMS Equipment	3.0
Integration with Traffcom OSPREY & Clyde Tunnel SIDERA	0.5
Total	**5.0**

9.0 The Clyde Tunnel

9.1 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.

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 £860k each year.

Traffic modelling confirmed that any unplanned closure of the Clyde Tunnel, due to lack of maintenance, would have an adverse socio-economic impact as well as a risk of reputational damage. The traffic modelling also confirmed the regional and national importance of this asset to the economy and its importance in serving the Queen Elizabeth University Hospital. Meetings were held with Transport Scotland (TS) to discuss the outputs of the traffic modelling and if any funding could be accessed. Although TS provided technical advice and information, they confirmed that they were unable to assist with any funding. GCC is preparing a Clyde Tunnel business case to support future funding bids.

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 Tunnel Manager, one operations controller, one assistant operations controller, twelve network officers (three on shift at any one time) and one electrician/fitter. The appointment of a Tunnel Manager (Clyde Tunnel & Tidal Weir) was completed in November 2021 and provides professional oversight, compliance with the Road Tunnel Regulations 2007 and defends GCC's legislative position. Operation safety detail is included in Appendix 1 at the end of this report.

9.2 Asset Condition

Road Tunnel Structural Repairs, Cathodic Protection, Emergency Cross Passage & Approach Ramp Grouting

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. Partial funding of £1m has been provided within Capital Investment for 2024/25. However, costs received from bidders initial funding was insufficient and further funding of £3m is required to complete all planned works. Structural modification to the existing cross passage is needed also it can become a compliant evacuation route. Approach ramp grouting repairs are required to improve condition and proper drainage.

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 watertight. The condition of these operational buildings increases the risk of system failures that may require the Tunnel to be closed.

Capital Investment funding was provided in 2023/24 to carry out some works with further funding of £1m in 2024/25 to complete required roof repairs to workshop roof and to the north and south ventilation buildings. During these roof works, the intake cowling and exhaust ventilation ducts on the north and south ventilation buildings were found to have lost protective galvanised coating allowing significant sections of rust to form, this is contributing to water penetration into the buildings and fans. Funding of around £500k is required to clean, repair and recoat the protective covering for these essential structural parts.

Cycle & Pedestrian Tunnels

The existing wall mounted fluorescent compact lamp fittings are beyond their design life and the associated cabling requires to be replaced. To promote active travel and safe use of the cycle and pedestrian ways, the existing lamps and cabling are be replaced with energy efficient LEDs, new cabling, CCTV & public address systems. This would greatly encourage active travel due to the more welcoming and safer environment. Capital Investment funding was provided in 2023/24 which has allowed AECOM consultants in mid-2024 to design LED lighting replacement throughout the pedestrian tunnel and service access. This will proceed to tender via procurement in late-2024.

North & South Ventilation and Plant Rooms

The original ventilation installation from the 1960s requires to be overhauled. This is used to automatically control pollution within the road tunnel via carbon monoxide/visibility sensors. The ventilation is also an essential part of the fire control systems.

9.3 Clyde Tunnel Investment Requirements

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

Clyde Tunnel (Priority = Red/Amber/Green)	**Estimate (£M)**
Cathodic Protection/Concrete Repairs Cycle & Pedestrian Tunnels	6.50
Intake Cowling & Exhaust Ventilation Repairs	0.53
SCADA Integration Cycle & Pedestrian Tunnel	0.32
Road Tunnel LV Power Supply and Distribution Upgrade	0.63
Clyde Tunnel Yard Security Gates & Intercom/CCTV	0.16
CCTV Cycle & Pedestrian Tunnels	0.11
Road Tunnel Replacement Drainage Pumps	0.21
LED & Cabling Cycle & Pedestrian Tunnels	0.63
Road Tunnel Emergency Cross Passage	2.11
Road Tunnel Ventilation Upgrade	0.53
Road Tunnel Fire Auto Fixed Fogging System, Gas Detection & Fire Ring Main	3.68
Clyde Tunnel Approach Ramps Grouting	0.21
Total	**15.62**

10.0 Ex GCC Housing Infrastructure

10.1 Maintenance Obligations

The roads, footways and footpath 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 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 landowner) obligations to ensure that these assets are safe and maintained to a reasonable standard. At present NRS undertake reactive repairs to ensure that these assets remain safe, however without planned investment these assets continue to 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 types of repairs forever and investment will be required to upgrade and replace these assets.

10.2 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. When updated to 2024 prices, this is now estimated to be in the region of £9.5m, although this will not take into account any likely deterioration that has occurred between 2015 and 2024.

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 £32m.

10.3 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.

11.0 Recommended Investment Options

Asset Group	Investment Option	Projected Outcome
Carriageways	£69.75m Over 5 Years	An annual investment of £13.95m for 5 years would lead to the Glasgow road network being in the best condition in over a decade.
Footways	£1.94m Per Annum	An annual investment of £1.94m is required to maintain the existing condition of our footway network.
Street Lighting	£104m Over 15 Years	An annual investment of £5.98m for 5 years would replace up to 9,200 'category Type 4' columns and associated cabling which would significantly reduce the risk of column failure.
Traffic Signals	£27.5m Over 5 Years	An annual investment of £5.5m 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	£2.9m	An investment of £2.9m would refresh road markings and install new poles and signage on the 20 bus corridors within the City.
Structures	£3.4m	A further £3.4m is required before the required works on the Shieldhall Overpass can commence to strengthen the bridge and remove the existing weight limit.
Structures	£90m Over 20 Years	An annual investment of £4.5m over a 20 year period would allow for the structures in the worst condition to be targeted for repair.
Clyde Tunnel	£15.6m	An investment of £15.6m would allow for the repair of operational infrastructure and structural issues.
Total Investment	£315m	

Asset Group	Additional Revenue Investment	Projected Outcome
Cycleways	£80k per annum	An additional investment of £80k would enable the required levels of gritting, sweeping, rain garden maintenance and surface maintenance to be carried out.
Road Drainage Systems	£1.4m per annum	An additional investment of £1.4m would allow for the current service levels for gullies on flood and arterial routes to be maintained in addition to a two yearly cycle of the neighbourhood gully programme to be implemented.
Traffic Signs, Lines and Street Furniture	£100k per annum	An additional investment of £100k over a sustained period would allow for the repair or replacement of all street furniture identified as being in poor condition
Total Additional Revenue Investment	£930k per annum	

Appendix 1 – Cycleways Impact of Recent Investment

Project & Description	Ongoing & Recently Completed Works
Connecting Woodside - area-wide active travel project. Aims to work with the community to improve streets and public spaces for walking and cycling whilst rebalancing streets to reduce the dominance of road traffic.	**Placemaking at the junction of North Woodside Road/Great Western Road** - works are currently on site to extend the footway to facilitate easier access for active travel users along with creating a public realm area that can be enjoyed by the local community. **St George's Road/Charing Cross** - installation of cycle segregation from Sauchiehall Street to Garscube Road. This cycle facility will provide a direct, safe, and inclusive connection for the communities of Woodside and Woodlands whilst supporting travel options for the recent regeneration of the communities of Hamiltonhill, Sighthill and Port Dundas. The works are currently on site with completion expected by December 2024.
South City Way	Work on delivering the final phase of South City Way, from Victoria Bridge to Trongate, was completed in May 2024.
East City Way - will deliver a safer, more comfortable walking and cycling active travel route between the City Centre and Mount Vernon.	The design and construction of the 7km route has been separated into seven phases with phases 6 and 7 completed prior to the UCI World Cycling Championships. A concept design has been developed for phase 5 which will be going to public consultation later this year.
Secure On-Street Cycle Parking	Planning is currently underway for phase 4 installations which will provide up to an additional 500 units over the next 5 years, equating to 3000 spaces. This will result in the availability of up to a total of 4230 secure cycle storage spaces across the City for residents. It is anticipated that the install of new units will commence in early 2025.
Pitt Street Active Travel Link - project design principles are derived from the Avenues objectives, which in turn are supported within the City Centre Transport Strategy's priorities for creating places for people with quality public realm, green infrastructure and innovative technology.	On site as part of the wider Holland Street Avenues project, however, due to onsite delays this project is now scheduled for completion in January 2025.
Connecting Yorkhill and Kelvingrove - active travel project prioritising cyclists and pedestrians to support sustainable and active transport travel choices. The project will see the delivery of segregated cycle tracks on strategic routes as well as improvements to public space to make walking, wheeling and cycling more comfortable, attractive and safe for people living in, and travelling through, the area.	Phase 1 of the works will be from Radnor Street to Sandyford Street, creating a connection between Kelvin Way and the new Govan – Partick Bridge. This phase will also see a link on Yorkhill Street with the existing cycle infrastructure on Old Dumbarton Road. It is anticipated that works will begin on site in early 2025.
Connecting Battlefield - area-wide active travel project within the Langside area . An aim to work with the community to improve streets and public spaces. The project will see the delivery of segregated two-way cycling tracks on strategic routes as well as improvements to public space to make walking, wheeling and cycling more comfortable, attractive and safe for people living in, and travelling through, the area.	Phase 1, from Victoria Road to Langside Road/Queens Park Street, will be completed in October 2024. Phase 2, from Grange Road/Queens Park Street junction down east kerbline of Grange Road and along the north kerbline of Battlefield Road to the junction of Cathcart Road, is anticipated to begin on site in April 2025.
North East Active Travel Route – will provide improved active travel routes in the form of segregated cycle lanes and improved pedestrian facilities, connecting the North East of the City to the City Centre, via the planned Inner North City Network. Pedestrian facilities include new crossings, and improvements to footways and side roads, linking users between Stobhill Hospital, via the proposed City Network into the City Centre.	Phase 1 started in March 2024 and will be completed by early 2025.

Appendix 2 – Clyde Tunnel Operational Safety

SCADA

The existing Supervisory Control and Data Acquisition system (SCADA) was replaced In July 2022 due to obsolete technology and lack of available replacement parts. This SCADA replacement has been installed in a new environmentally controlled server room and provides a modern system for control of pumps, ventilation, lighting, telephones, fire control, and VAID. Further sub-systems can be added later to the fibre backbone provide extra integrated functionality at a lower cost than a standalone implementation.

LED Lighting

LED Lighting installation in both bores of the Tunnel was completed in June 2022 and has been fully integrated into SCADA. This major improvement work provides modern, controllable energy efficient lighting that is compliant with current safety and design standards. Our electricity supplier has indicated a 50% saving has been achieved on our typical 94,000 kWh monthly usage for lighting at the Clyde Tunnel after introduction of LED Lighting.

Telephone System

The aging analogue PABX internal & SOS telephone was updated in September 2022 to a modern IP internal telephony system with enhanced routing features, call recording, fault reporting and integration with SCADA systems.

VAID

The Clyde Tunnel has a variety of critical operational safety systems and equipment. A new Video Automated Incident Detection (VAID) system was installed in October 2021 and later integrated with the upgraded SCADA improving traffic control and incident detection. The system was extended further in July 2022 to enhance ramp & portal visibility. This replaced the old proprietary analogue VAID system that was beyond its design life and provides additional safety functionality and enhanced digital camera coverage along with incident recording and limited archiving of video.

Road Tunnel Fire Detection

Funding has been sourced to upgrade the obsolete ADT Fire Control system which is required to provide compliance with Design & Refurbishment Code of Practice for Roads Tunnels (CD352). An independent Fire Risk Assessment was carried out in September 2022 and plans are progressing to have a new Fire Control system installed mid-2025. This fire control system will also be fully integrated within the new SCADA system.

Clyde Tunnel Yard

Increase of security required for Clyde Tunnel yard to avoid unwanted visitors by installation of remotely controlled vehicle gates and intercom/CCTV system.

Electric Vehicle Batteries

An emerging risk is that of potential for Electric Vehicle (EV) fires occurring within the tunnel. The risk of an EV fire within the tunnel is low however the impact is very high should it happen. A working group has been setup to investigate options to mitigate the risks to the public, staff and tunnel structures. We will look at engaging with specialist contractors to assist recovery of vehicles and procedures to deal with contaminated by-products from any fire. As the only road tunnel within Scotland, the working group will be taking the lead in developing new operational procedures and regular review as necessary.

Business Continuity Plan

The Glasgow Operations Centre (GOC) will be updated by end-2024 to include backup facilities for operational control of Clyde Tunnel to ensure business continuity as and when required. On-site backup and training facilities are also available within the meeting room at the Clyde Tunnel. This SCADA integration will be regularly tested to ensure easy transition between operational sites and will be utilised during live exercises to ensure multi-agency responses are fully co-ordinated.

Public Address, Radio Re-broadcast

The Clyde Tunnel has no public address, voice alarm, Emergency Services Airwave Radio or public 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 emergency services and evacuees could be compromised.

Variable message signing (VMS) and improved traffic control is required to provide compliance with Design & Refurbishment Code of Practice for Roads Tunnels (CD352). Funding of £950k was provided from Capital Investment programme for 2023/24 & 2024/25 to proceed with installation via tender in mid-2025. Procurement of consultancy services to inform the tender process is proceeding in late-2024.

Mobile Telephony

Vodafone in conjunction with local contractors identified the Clyde Tunnel as critical infrastructure and will install upgraded “leaky feeder” cabling late-2024, this will provide mobile telephony signal inside the road tunnel and pedestrian tunnel.

Road Tunnel Fire Protection

Comprehensive active fire protection installations are required to provide compliance with Design & Refurbishment Code of Practice for Roads Tunnels (CD352). Refer to the table in Section 9.3.

HV Power Supply

Scottish Power Energy Networks (SPEN) upgraded the dual power supplies (North & South) to the Clyde Tunnel from 6.6KV to 11KV High Voltage (HV) within their national programme in May 2022. The Clyde Tunnel’s cabling, switch gear and sub stations were earlier upgraded to accept the 11KV SPEN HV supply. A designated HV Authorised Person has been appointed, the upgrade works and authorised person improves the resilience of the HV electrical supply to the Clyde Tunnel.

LV Power Supply

Further works are still required on the Low Voltage (LV) Power Supply and Distribution which requires to be upgraded as this is an original installation from the early 1960s. See table in Section 9.3.

Pedestrian & Cycle Tunnel

To promote active, environmental needs and to be attractive and safe for users, several investment requirements are needed to improve the environment are included in the table in Section 9.3.

Replacement Drainage Pumps

The Clyde Tunnel drains any water reaching the road deck during heavy rainfall towards sumps below the pedestrian and cycleway tunnels. This is automatically pumped away, when necessary, by two sets of three pumps which activate in sequence to keep levels under control. This is monitored and controlled by the integration into our SCADA system.

The existing surface mounted pumps are around twenty years old and failing. Several recent attempts to rebuild these pumps to the original design specification has failed as the pumps are still overheating under load. If these were to fail, the sumps could overflow into the pedestrian and cycleway tunnels and eventually into the road deck above. A costing exercise was carried out comparing costs of refurbishment against replacement with new pumps which was significantly cheaper and would prove more reliable. Revenue funding was used to replace three pumps in late 2024 and plans are ready to replace the other three pumps in 2025.