

January 2024

AECOM

APPENDIX 2

Cardiff Bus Priority Plan 2024 – 2030

Strategic Corridor Improvement Proposals

This document forms supporting information for the Cardiff Bus Priority Plan 2024-30 developing how the plan can be applied to a number of strategic corridors. Details of the approach to improvements and range of measures are outlined and applied.

01

Strategy overview

Overview of the corridor study

Overview

Bus service improvements are driven by six core objectives. Improvement measures will focus on the strategic bus corridors.

We propose to grow bus patronage and increased mode share through a multi-modal approach that positively manages the highway network to provide bus priority and reduce congestion and that is aligned with the active travel measures, metro proposals and supports general traffic access.

Our objectives for the medium-term plan are:

1. Faster and more reliable bus services
2. Attract more funding for bus priority measures
3. More accessible services that are easier to use
4. Better integration between bus services and between rail, light rail and bus.
5. Bus routes and stops designed to complement walking and cycling facilities
6. More accessible and real time information to make journey planning easier

We recognise that there is limited highway space, and all modes cannot be prioritised on all routes. Therefore, the approach we are taking is to identify the **Core Bus Network** that carries 80% of all bus passengers and **congestion hot spots** where the impact on bus reliability is significant. Bus will take priority over other modes at these locations to maintain a fast, safe, and reliable service.

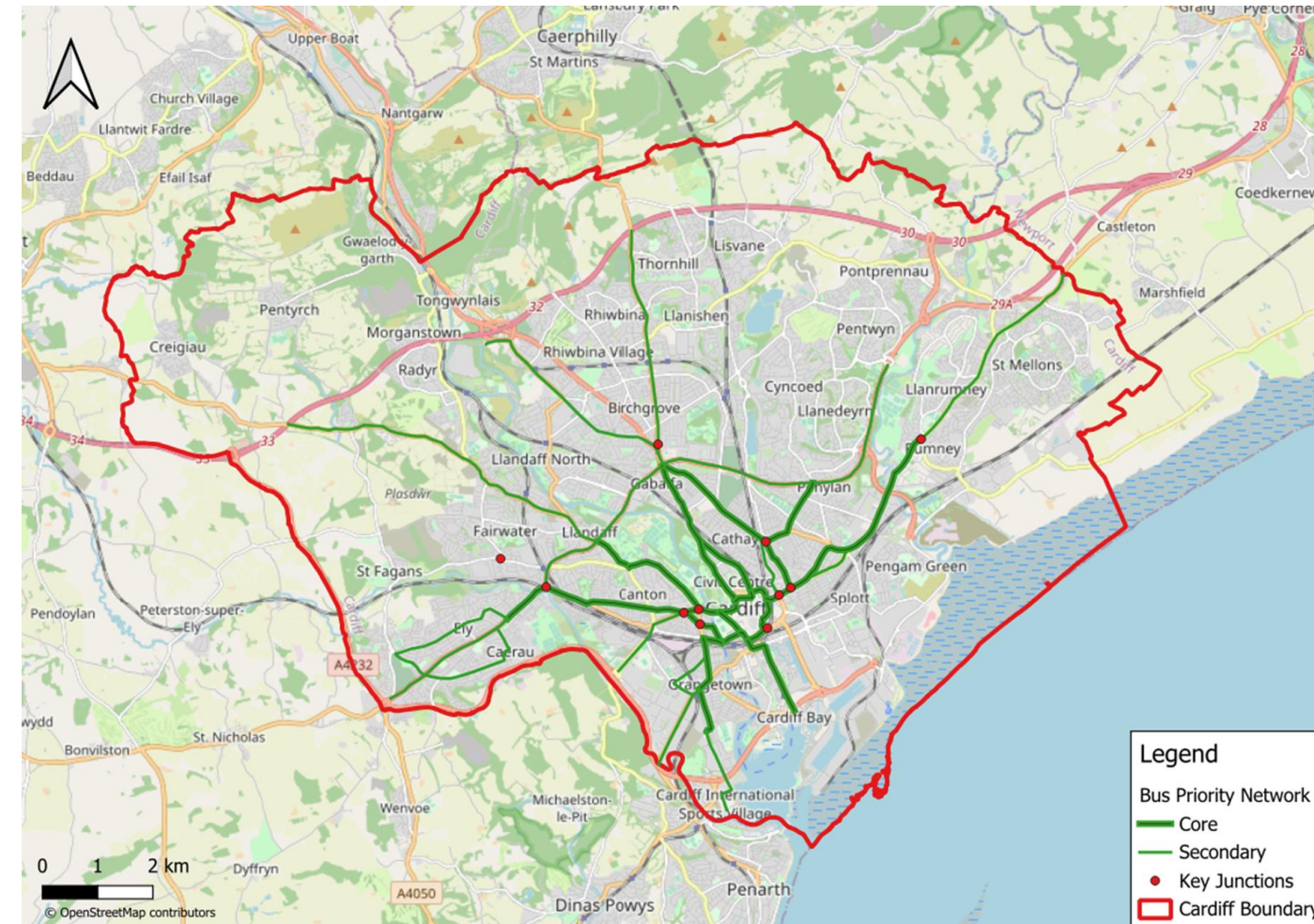
Core Bus Network

Our medium-term bus infrastructure plan focuses investment on the most congested sections of those routes that collectively carry approximately 80% of all bus passengers in the city. These will form the Core Bus Network. Beyond these, several Key Junctions have been identified as locations where bus services experience significant delay and will be a focus for bus priority intervention. The type of measures to be considered along the Core Bus Network and Key Junctions will include dedicated bus lanes, bus gates and traffic signal priority to ensure service punctuality and reliability.

There is also an extensive city centre programme of bus priority measures and transport interchange investments underway that complement the bus network measures contained within this medium-term plan.

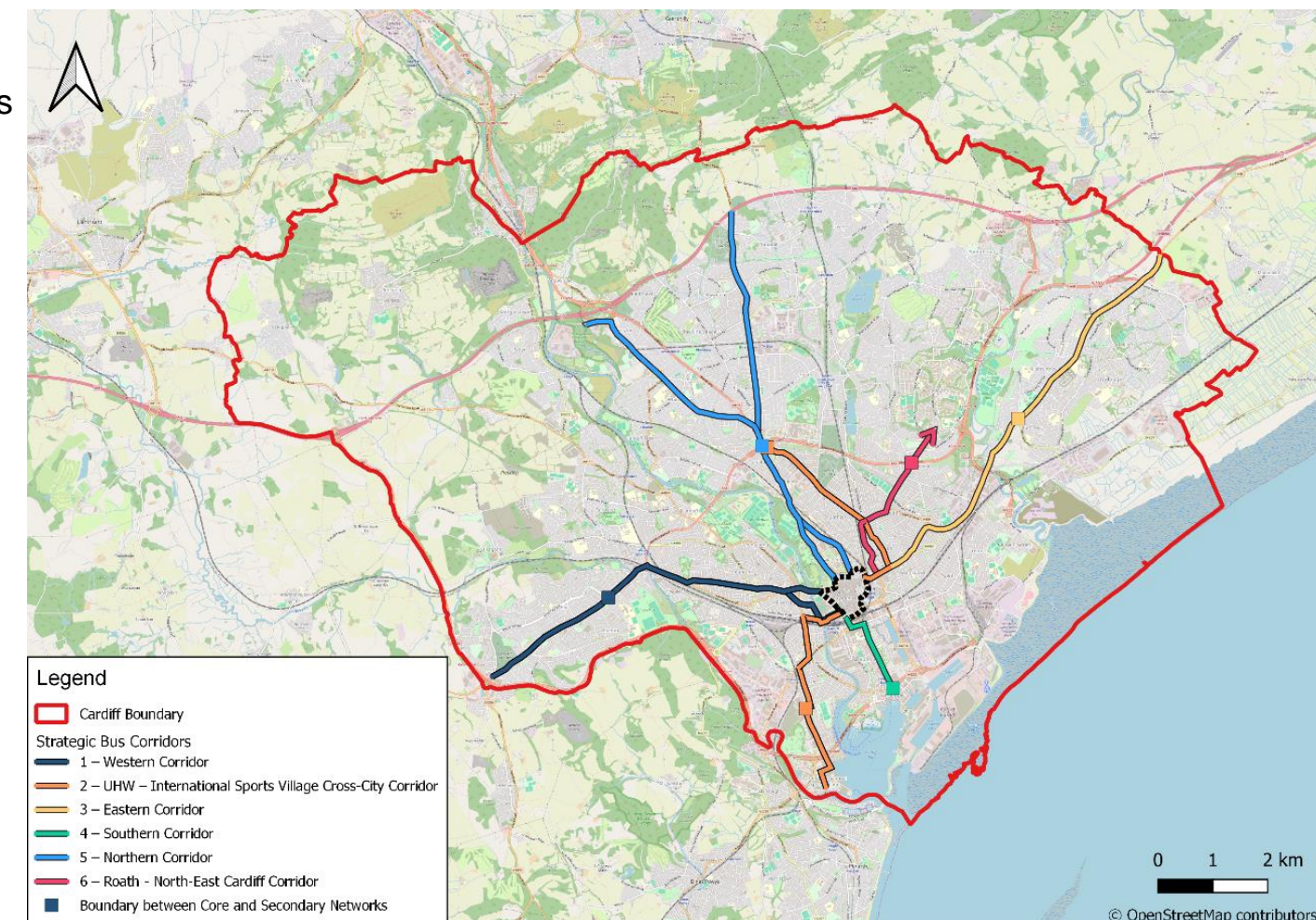
Secondary Bus Network

Other routes that carry significant passengers and which connect key destinations are identified as a secondary bus network. These will be considered for more modest priority interventions, including signal priority at junctions, passenger information and improved waiting facilities and passenger information. Many of these services start or end in the city centre and would also benefit from many of the priority measures implemented on the core bus network.



Strategic Bus Corridors

In order to deliver our ambitions for the bus network, a priority list of Strategic Bus Corridors and key junctions has been developed, following key stakeholder engagement. The Strategic Bus Corridors, made up of Core and Secondary routes, are shown in the adjacent Figure (RHS).



User focused approach to investment in bus infrastructure

The bus strategy is taking a user-focused approach to our investment in bus infrastructure and priority measures that will focus on the journey quality. This means that from a design perspective all aspects of the bus journey will be considered for improvement, with passengers at the heart of bus services and “priority” needs to consider their end-to-end trip not just the time on the bus.

Taking this approach means investment is needed on cycling and walking routes to the stops; accurate and accessible bus service information and high quality, safe and comfortable waiting facilities, as well as investment in vehicle focused bus priority infrastructure. A more holistic and varied package of measures over and above just bus lanes is therefore required in order to improve that overall user journey.

The objective of providing bus priority infrastructure is to enable the bus to operate in a quick, reliable and safe way, with minimum delay. Any factor that can inhibit the speed or reliability should be addressed from parking, to bus stop design through to traffic signal operation. The range of measures to be considered includes:

- Priority Lanes
- Bus restrictions
- Kerbside controls
- Priority at junctions
- Technology
- Bus Stops
- Passenger safety and access
- Wheeling and buses
- Supporting/complementary measures



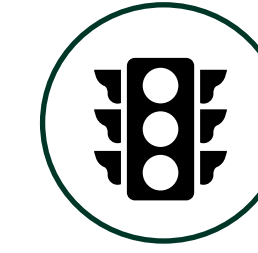
Bus and priority vehicle lanes



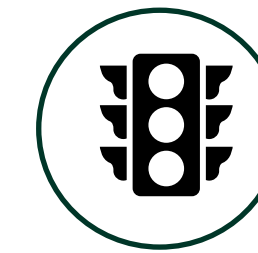
Bus only movements including bus gates or exemptions from bans



Parking and loading controls including red routes



Priority for buses at junctions including dedicated lanes or junction changes



Traffic and signal control with bus priority



Bus stops and mobility hubs including waiting areas



Passenger safety, crossings / route considerations



Cycle facilities and bus access



Supporting measures covering enforcement, information, ticketing, etc

Types of bus service improvement measures

Intervention	Types of measure
Priority Lanes	With-flow bus lanes operating different times/days Contra-flow lanes Managed / priority vehicle lanes allowing access by other vehicles e.g. freight Segregated busways
Bus restrictions	Bus Gate Bus only street
Kerbside controls	No waiting No loading Loading bays Parking Restrictions – full-time and part-time restrictions Inset parking/loading bays Red Routes (linked to wayfinding and signing strategy)
Priority at junctions	Side road closures Vehicle pathway turn bans Turn ban exemptions for buses Left turn except buses Changing junction priority
Technology	Traffic signal health checks and optimisation Traffic signal priority – real time SVD/Bus detection Pre-signals UTMC Measures 'Virtual bus lanes' and queue control Payment Systems and SMART Ticketing Real time service information
Bus Stops	Redesign Relocate Remove and Rationalise Mobility Hubs / Interchange Electrification
Passenger safety and access	Access improvements and inclusive mobility measures – crossing facilities, pavement treatment Personal security (CPTED/CCTV)
Wheeling and buses	Bus lanes and cycles Bus stops and cycles Complementary measures Mobility Hubs
Other	Enforcement of bus lanes and Traffic Regulation Orders (TRO) Information – Real Time Passenger Behaviour Change Activities Network Management including roadwork management and co-ordination Ride Quality & Maintenance Regimes Cashless & Integrated Ticketing Demand Responsive Transport and bus priority



High-level Design Options

Following completion of the initial route design audits, high-level design options have been developed for three routes within the Strategic Bus Corridors. The design options highlight existing constraints and apply the interventions presented on the previous page at specific locations. Design option plans have been produced for:

- Route 1 – Western Corridor
- Route 2 North – UHW - International Sports Village Cross-City Corridor
- Route 2 South – UHW - International Sports Village Cross-City Corridor

All proposed measures look to provide deliverable solutions that balance bus reliability, journey time and accessibility.

The following themes were identified by the route audits across the three routes:

- Limited / no bus priority measures at key junctions causing significant delays.
- Inconsistent widths of bus and general traffic lanes.
- Illegal parking and loading.
- Placement of bus stops away from safe pedestrian crossing facilities and walking links.
- Inconsistent pedestrian provision especially at side road junctions.
- Large quantities of on-street parking.

As mentioned within the Bus Plan, a key consideration must be to employ a network approach to further development of bus and active travel corridors within the city where there is a clear hierarchy of modes in place. This will ensure development of a cohesive network of routes that are accessible to a wide range of users.



Route 1 – Western Corridor

The following measures are proposed throughout Route 1:

- Improved kerbside control to prevent pavement parking and vehicles partially blocking running lanes and bus stops.
- Consistent side road entry treatments to improve the pedestrian experience and reinforce driver / pedestrian behaviours at side roads.
- Reduction of junction radii / narrowing to reduce vehicle speeds and improve visibility between pedestrians and vehicles.
- Removal of guardrail to increase useable width of footways.
- Proposed review of traffic signal timings to improve junction operation.
- Relocation of bus stops closer to safe pedestrian crossing facilities.

In addition to the measures above the following options are also presented:

A48 / A4161 Roundabout



Opt. A - Redesign of existing roundabout to include bus priority		Opt. B - Introduction of signal controlled junction with bus priority measures	
+ve	-ve	+ve	-ve
Scope to provide bus lanes through the junction within existing highway land by reallocating road space	Existing safety issues may not be able to be satisfactorily addressed	Scope to integrate signal control to better manage congestion at peak	Reduced traffic capacity on primary route
	Limited opportunities to improve environment for pedestrians and cycles	Option to include improved cycle / walking facilities at the junction	Increased construction impacts and cost
		Existing safety issues can be eliminated or mitigated	

Cowbridge Rd E / Wellington St / Neville St



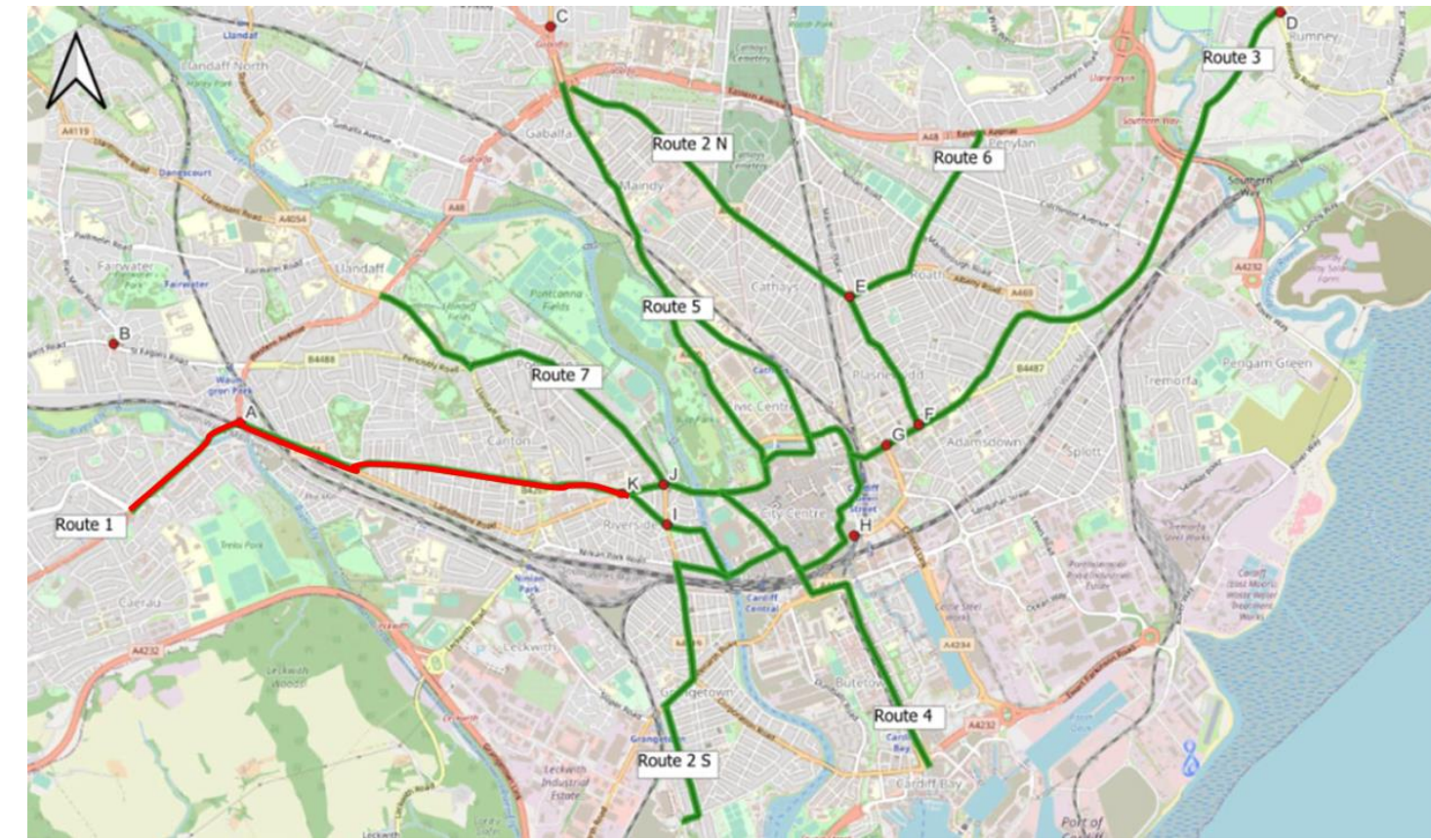
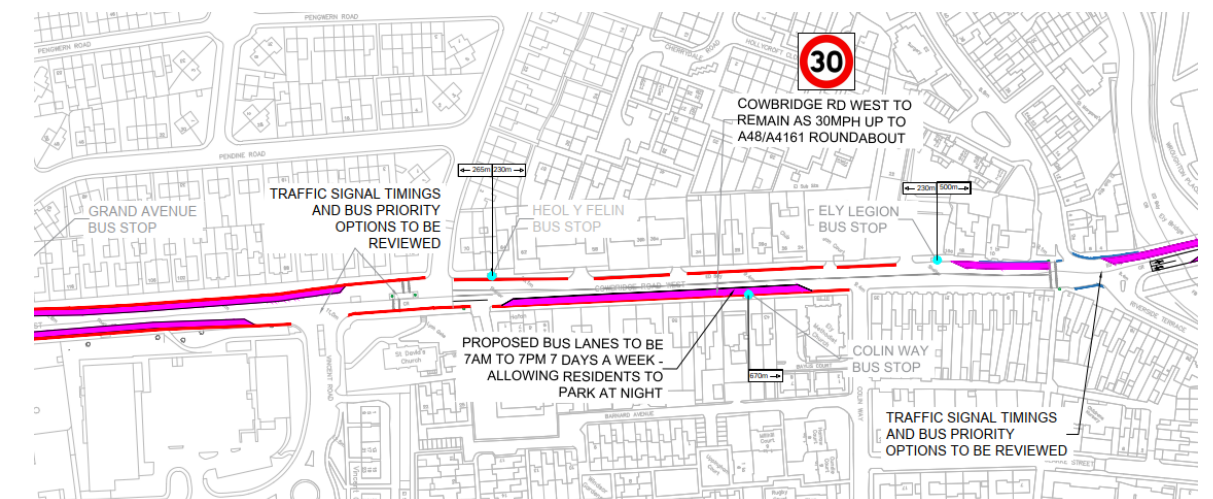
Options considered at this location included an offside bus lane to provide priority for eastbound buses up to the stop line in an area of heavy congestion.

Further consideration should also be given to opportunity to provide a westbound bus gate located to the west of the St David's Hospital access. This would reduce congestion on Cowbridge Rd East, improving westbound bus journey times.

These options should be considered in the context of further traffic modelling, investigation of alternative traffic routing and the proposals associated with Cycleway 5.

Cowbridge Rd W west of Ely Bridge

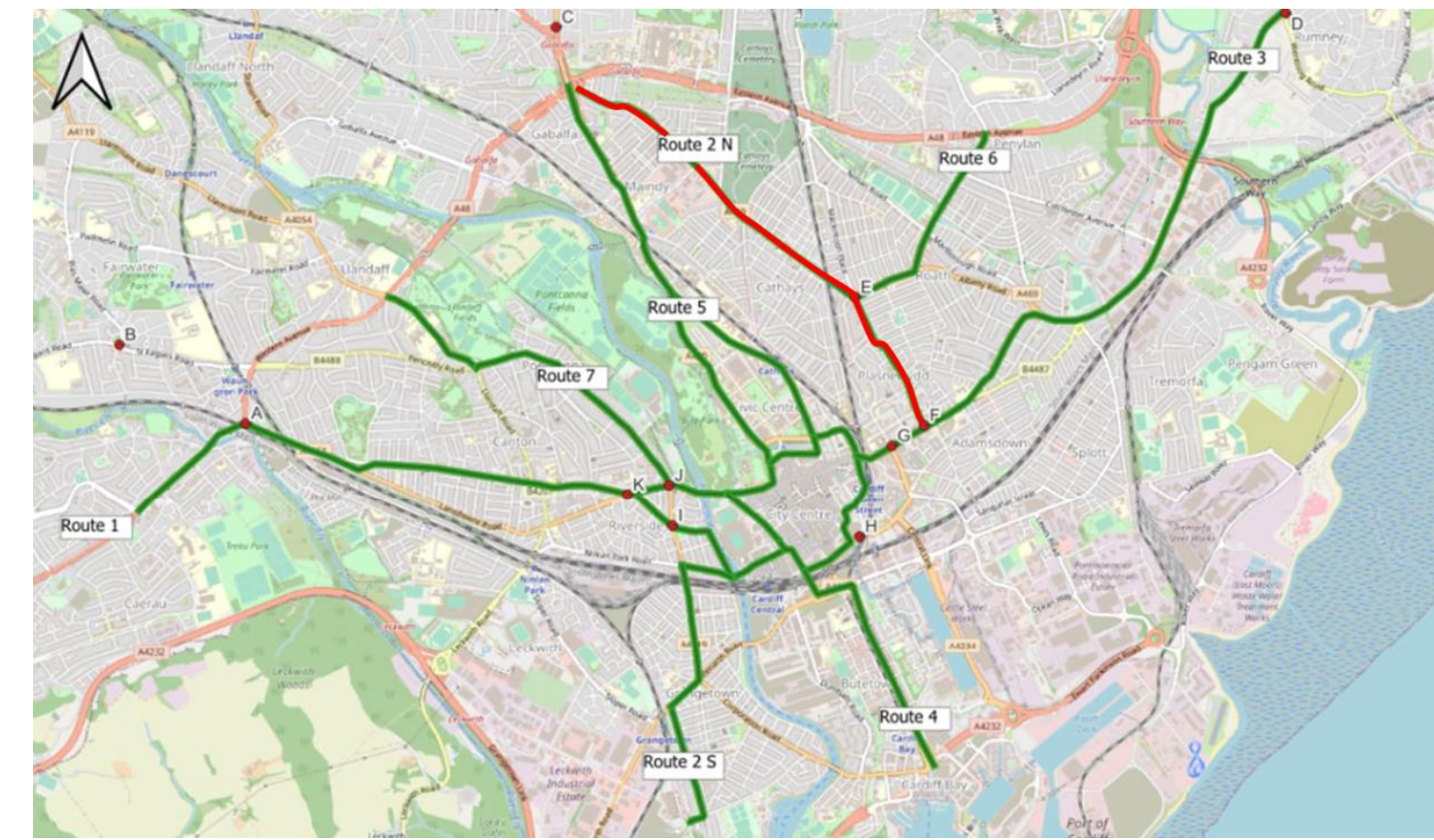
Proposed reallocation of road space to accommodate eastbound and westbound bus lanes. Impacts on traffic capacity could be reduced by providing bus lanes on the approach to signal controlled junctions only as these will provide maximum benefit for bus journey time.



Route 2 North – UHW - International Sports Village Cross-City Corridor

The following measures are proposed throughout Route 2 North:

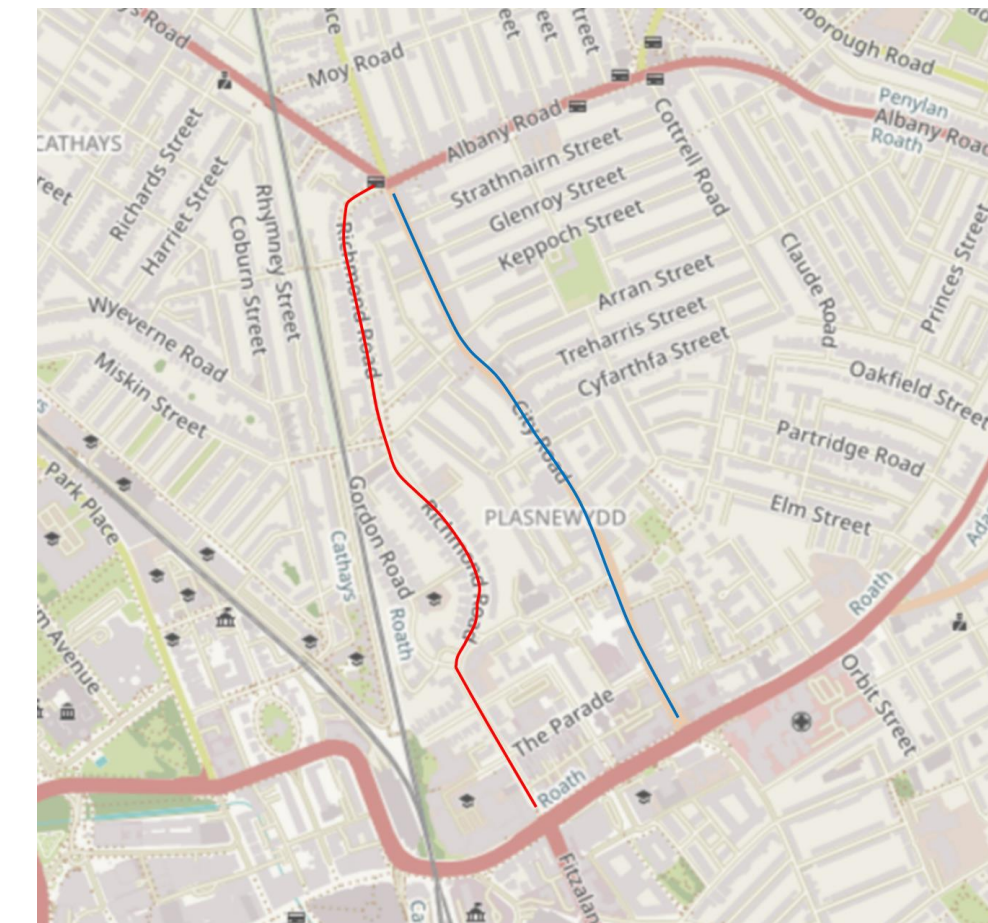
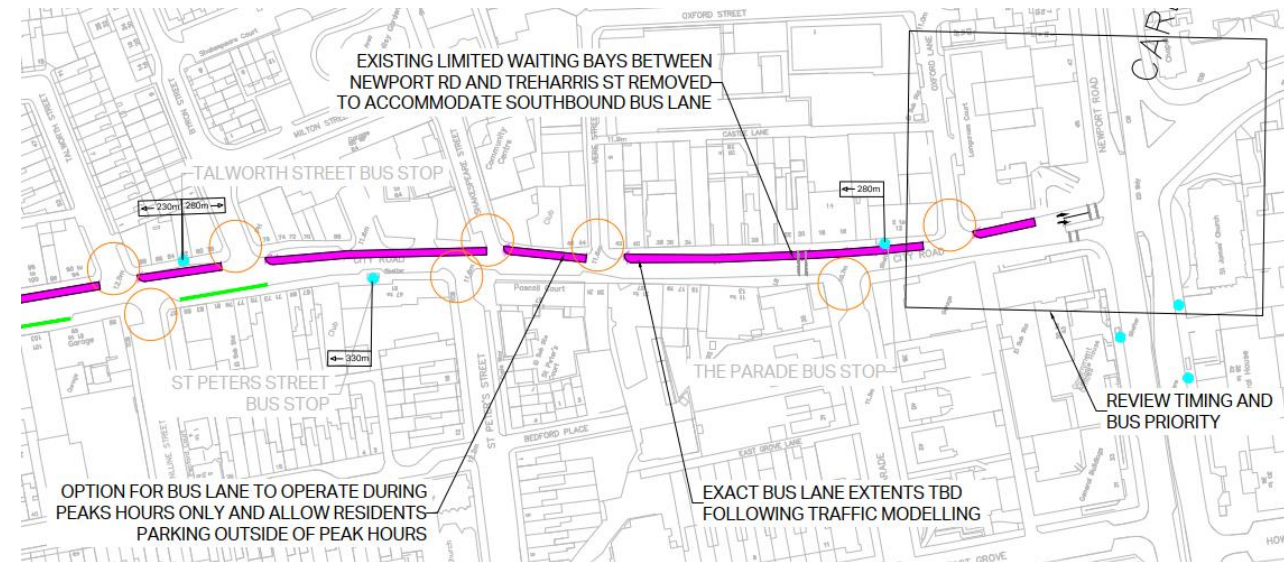
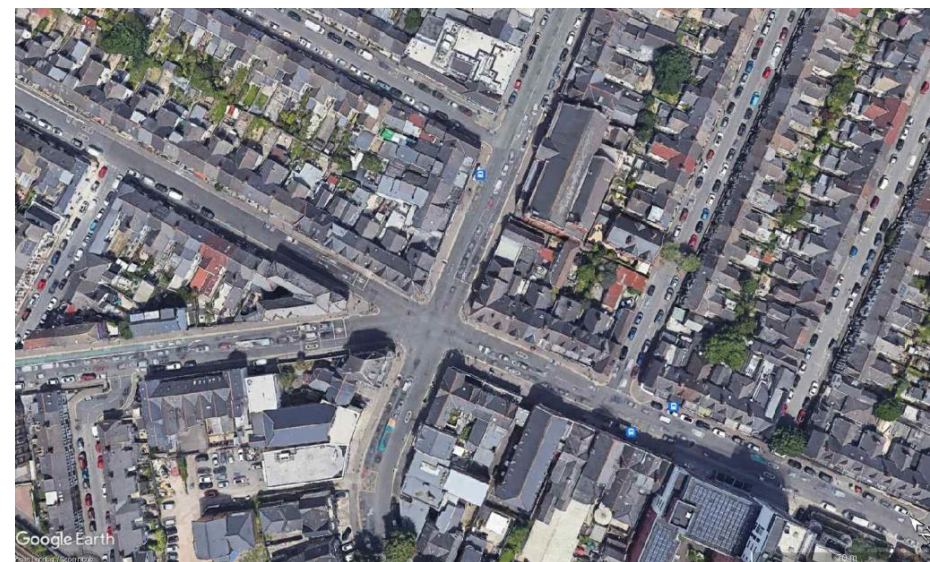
- Improved kerbside control to prevent pavement parking and vehicles partially blocking running lanes and bus stops.
- Consistent side road entry treatments to improve the pedestrian experience and reinforce driver / pedestrian behaviours at side roads.
- Removal of guardrail to increase useable width of footways.
- Proposed review of traffic signal timings to improve junction operation.
- Junction kerb changes to simplify and improve efficiency for all modes
- Removal of bus laybys to prevent bus exit delays.
- Consolidation of traffic lane widths.



In addition to the measures above the following options are also presented:

MacKintosh PI / Albany Rd / City Rd / Richmond Rd / Crwys Rd

City Rd Southbound Bus Lane



Further work could be undertaken to explore opportunities to provide bus priority measures for southbound buses up to the stop line and to restrict existing general traffic movements to improve junction operation.

Proposals should be developed in coordination with cycleway proposals on Albany Rd and Richmond Rd

Previous proposals have looked to develop a southbound bus lane on City Road. This would require the removal of limited waiting bays predominantly on the east of City Rd (dependent on bus lane extents). This should be coordinated with the proposals to route northbound buses via Richmond Rd. The proposed southbound route is highlighted in blue and the northbound route in red (see plan on LHS). The proposed City Rd bus lane would terminate prior to the junction with Newport Rd to provide a multi lane approach for general traffic.

Proposed bus lanes should be delivered without worsening the pedestrian provision by narrowing existing footways.

Route 2 South – UHW - International Sports Village Cross-City Corridor

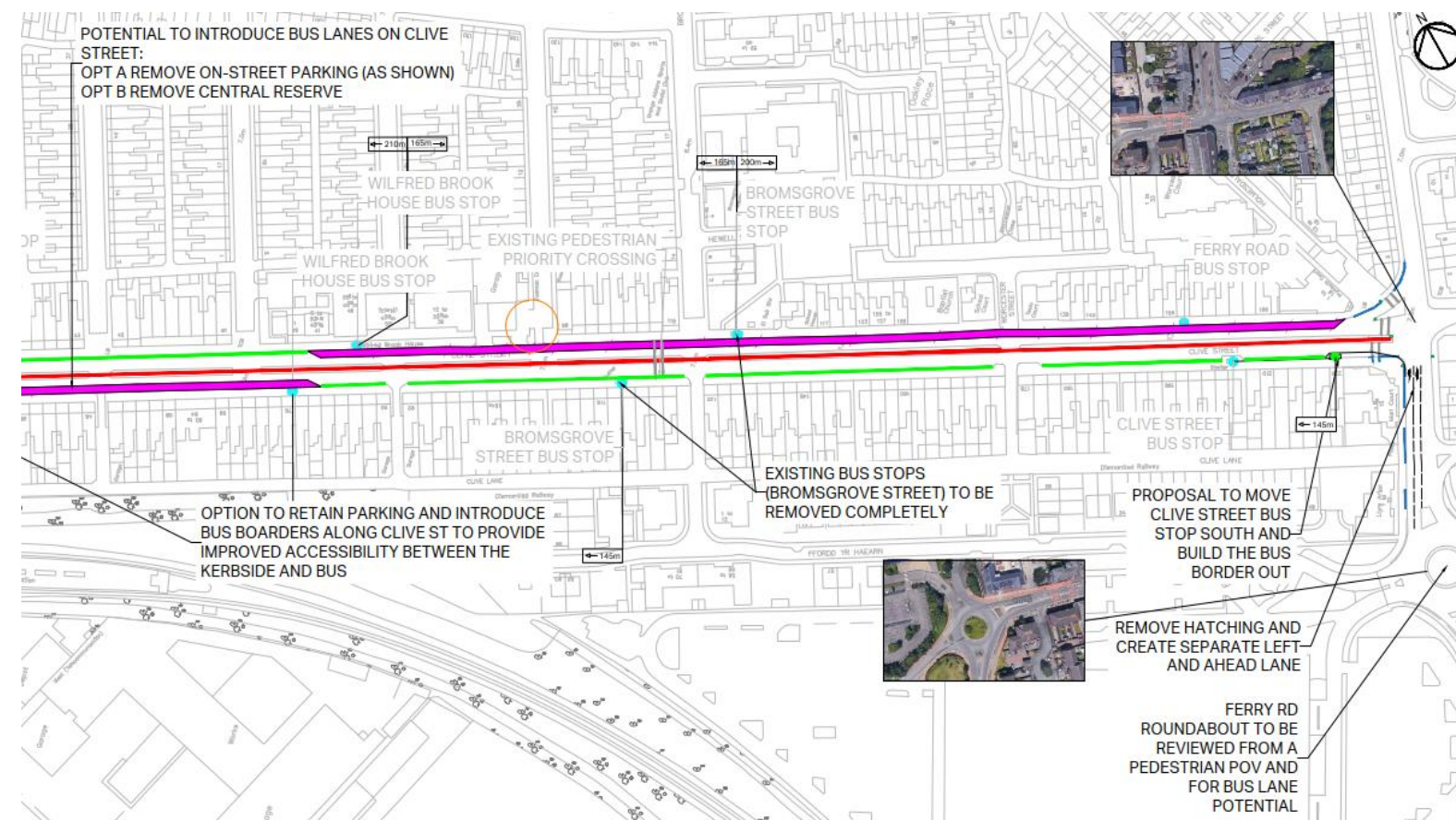
The following measures are proposed throughout Route 2 South:

- Improved kerbside control to prevent pavement parking and vehicles partially blocking running lanes and bus stops.
- Consistent side road entry treatments to improve the pedestrian experience and reinforce driver / pedestrian behaviours at side roads.
- Removal of guardrail to increase useable width of footways.
- Proposed review of traffic signal timings to improve junction operation
- Junction kerb changes to simplify and improve efficiency for all modes
- Proposed bus borders to improve accessibility between the footway and bus.



In addition to the measures above the following options are also presented:

Bus Lanes on Clive St



Proposals to introduce northbound and southbound bus lanes on Clive St by removing on-street parking (Opt. A) or the central reserve (Opt. B) with associated upgrades to the junctions with Penarth Rd (North) and Ferry Rd (South).

Opt. A – Removal of on-street parking		Opt. B – Removal of central reserve	
+ve	-ve	+ve	-ve
No requirement for significant kerb realignment or tree removal	On-street parking appears well used by local residents so removal may cause significant disruption	Limited impacts on existing on-street parking	Would require removal of several mature trees
Lower cost option			

Penarth Rd / Clive St Junction

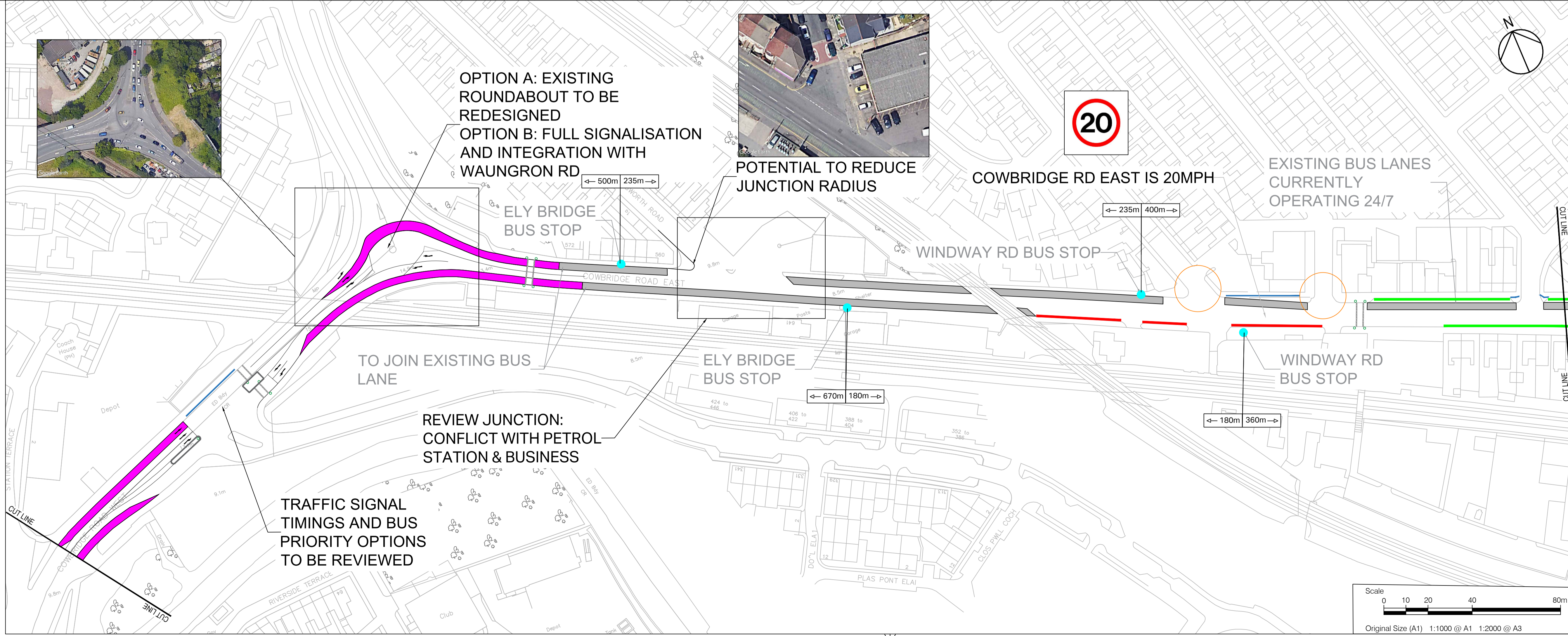
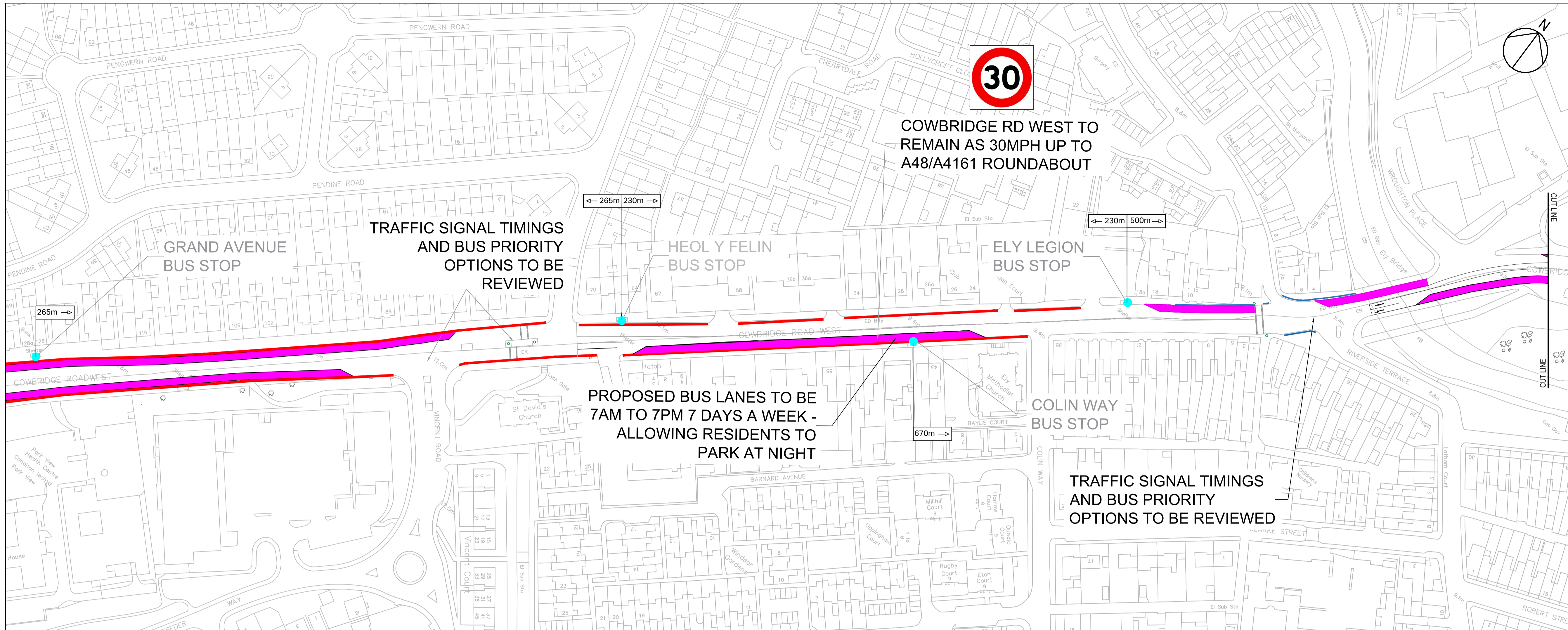
Proposals should look to primarily provide safe pedestrian crossing facilities on all arms of the junction. In the existing setting, controlled pedestrian crossing facilities are only provided on 2 of the 4 arms.

Penarth Rd / Clare Rd Junction

There may be an opportunity to remove buses from Paget St and close it at the junction to simplify operation. This may also provide additional benefits such as a minimised junction footprint and reduced pedestrian crossing distances.



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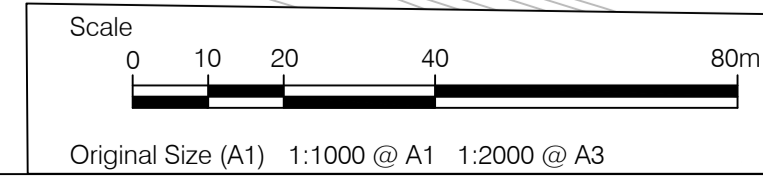
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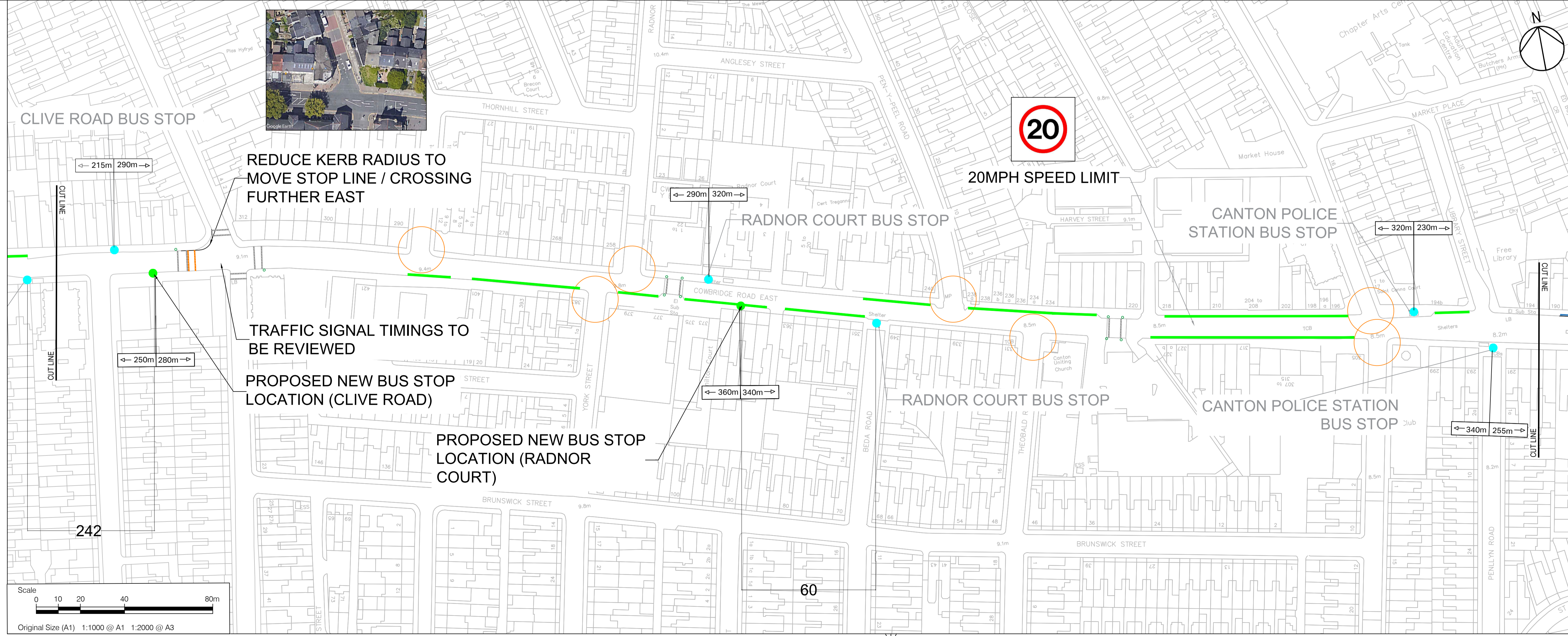
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CARDIFF BUS ROUTE ENHANCEMENTS

Drawing Title

ROUTE 1 GENERAL ARRANGEMENT SHEET 2 OF 3

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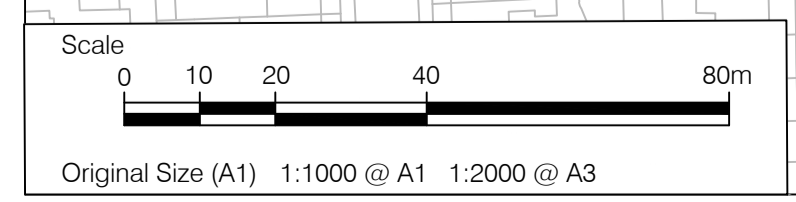
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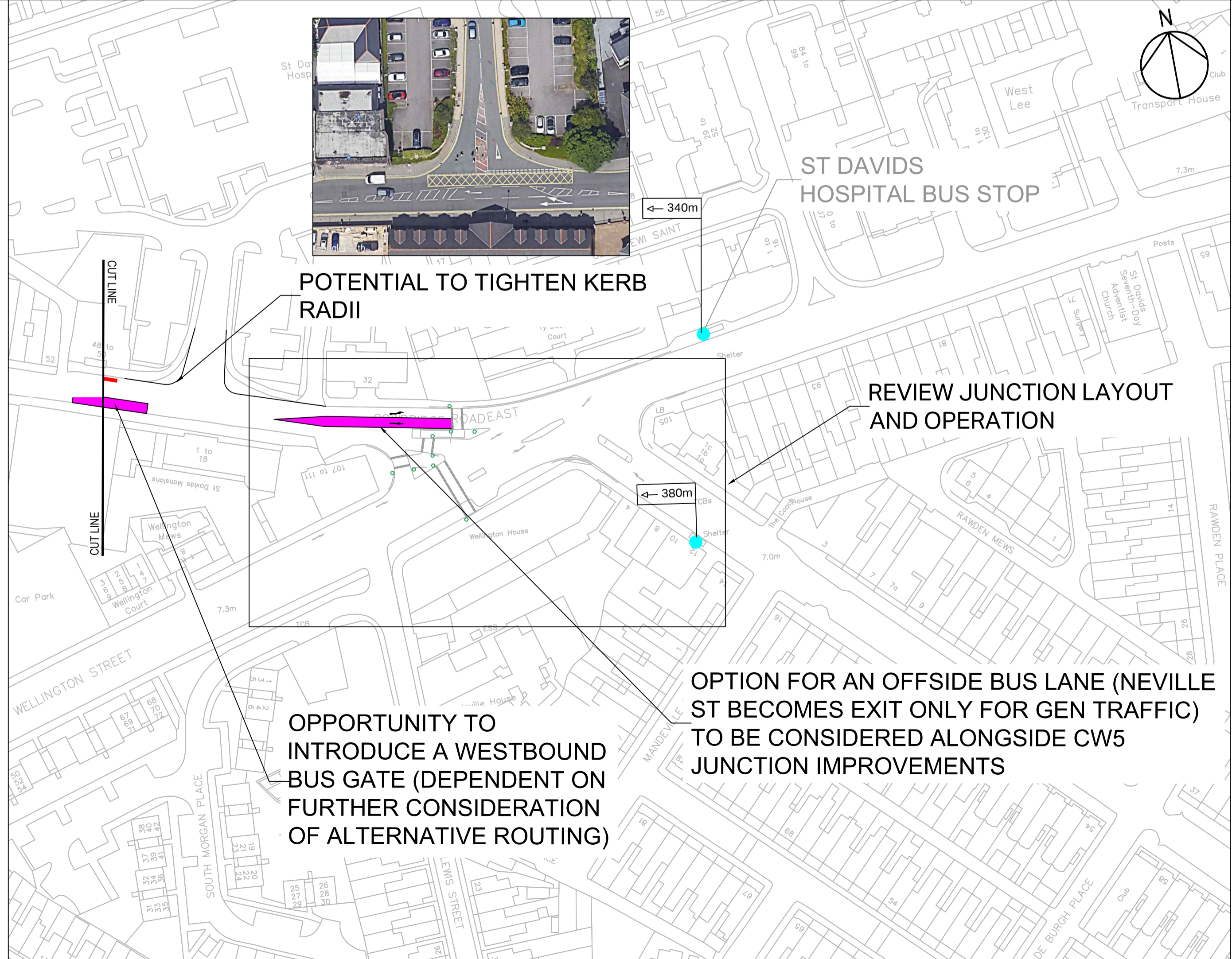
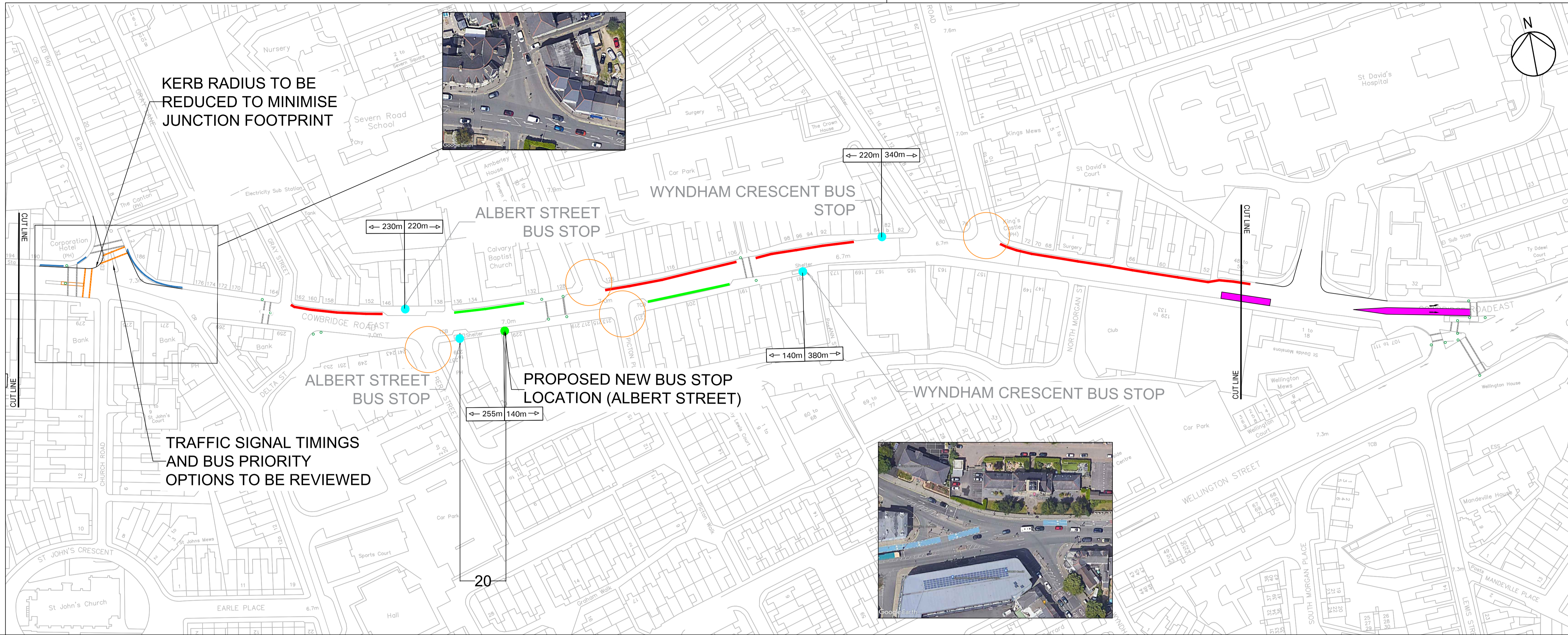
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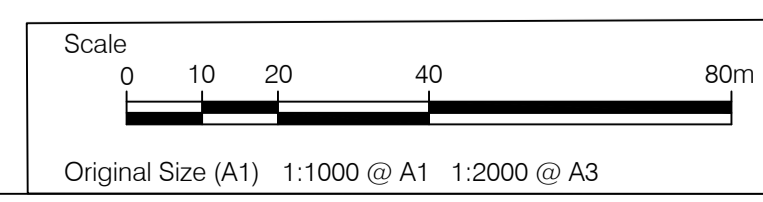
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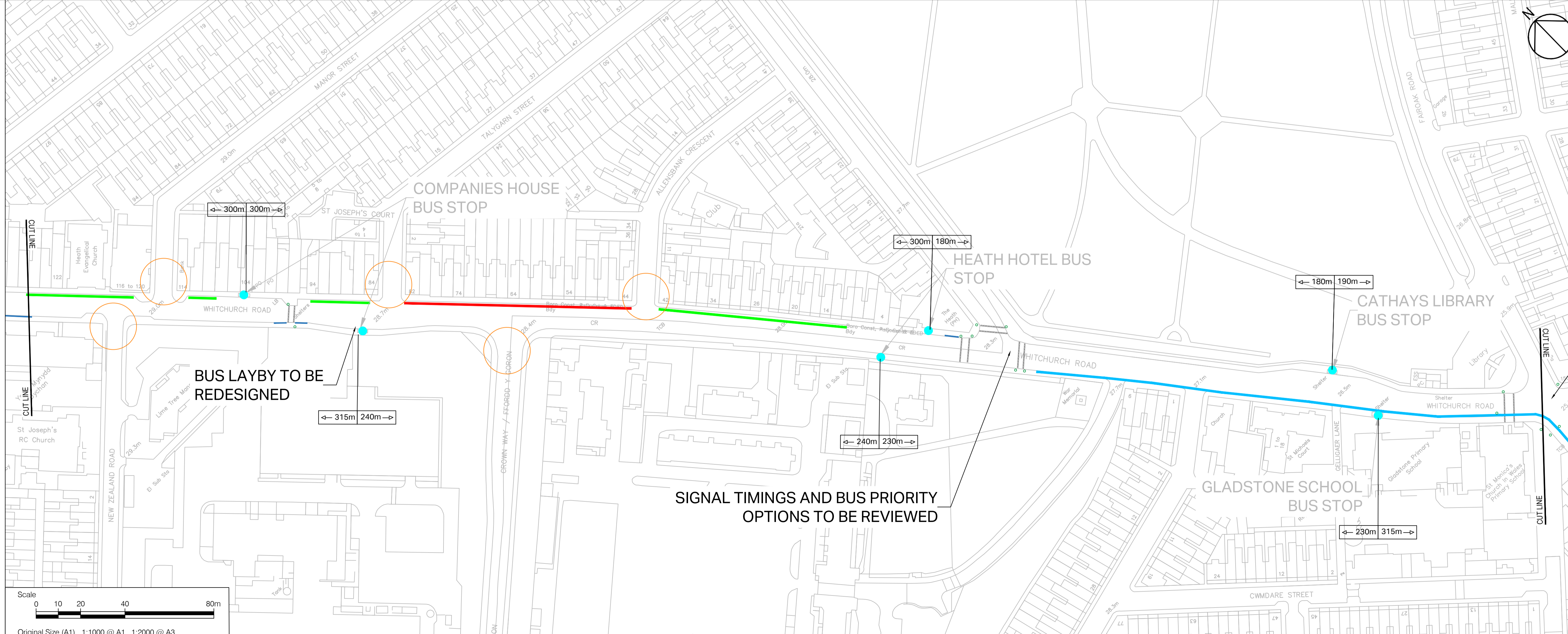
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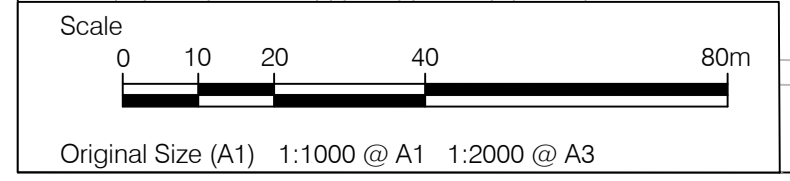
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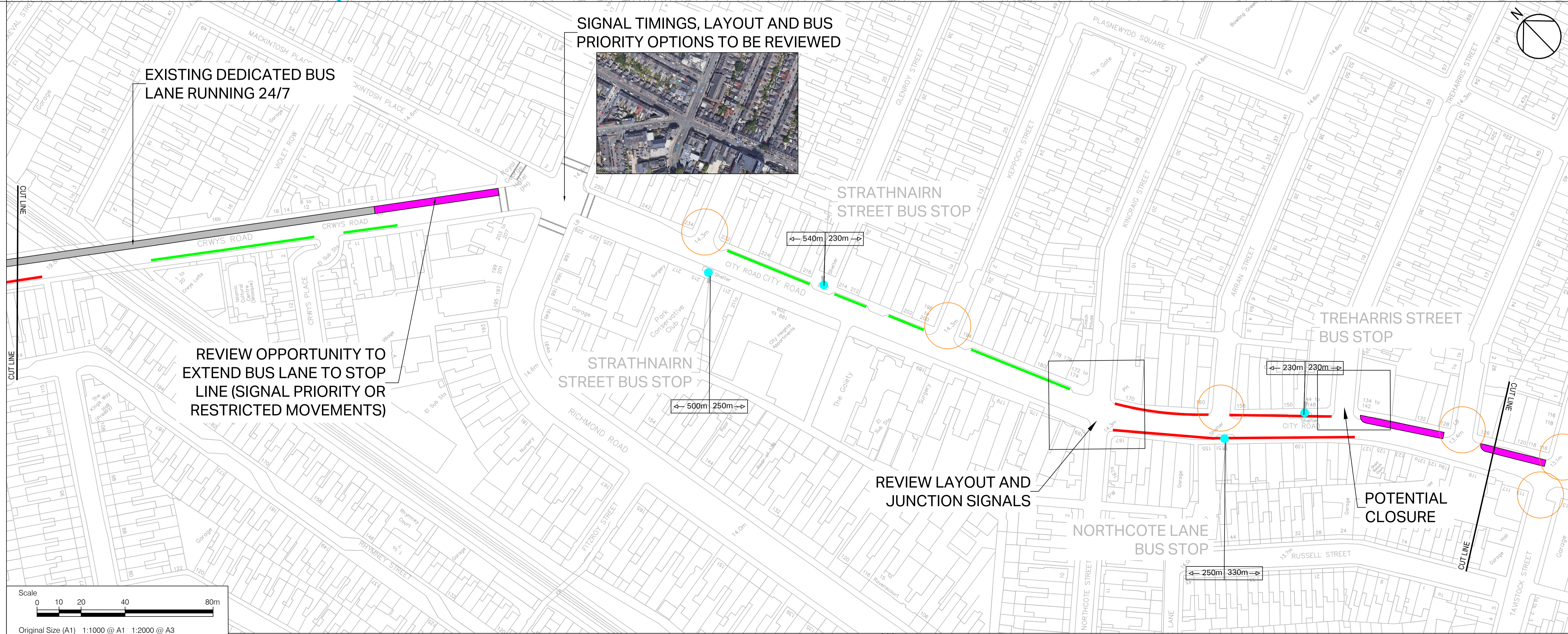
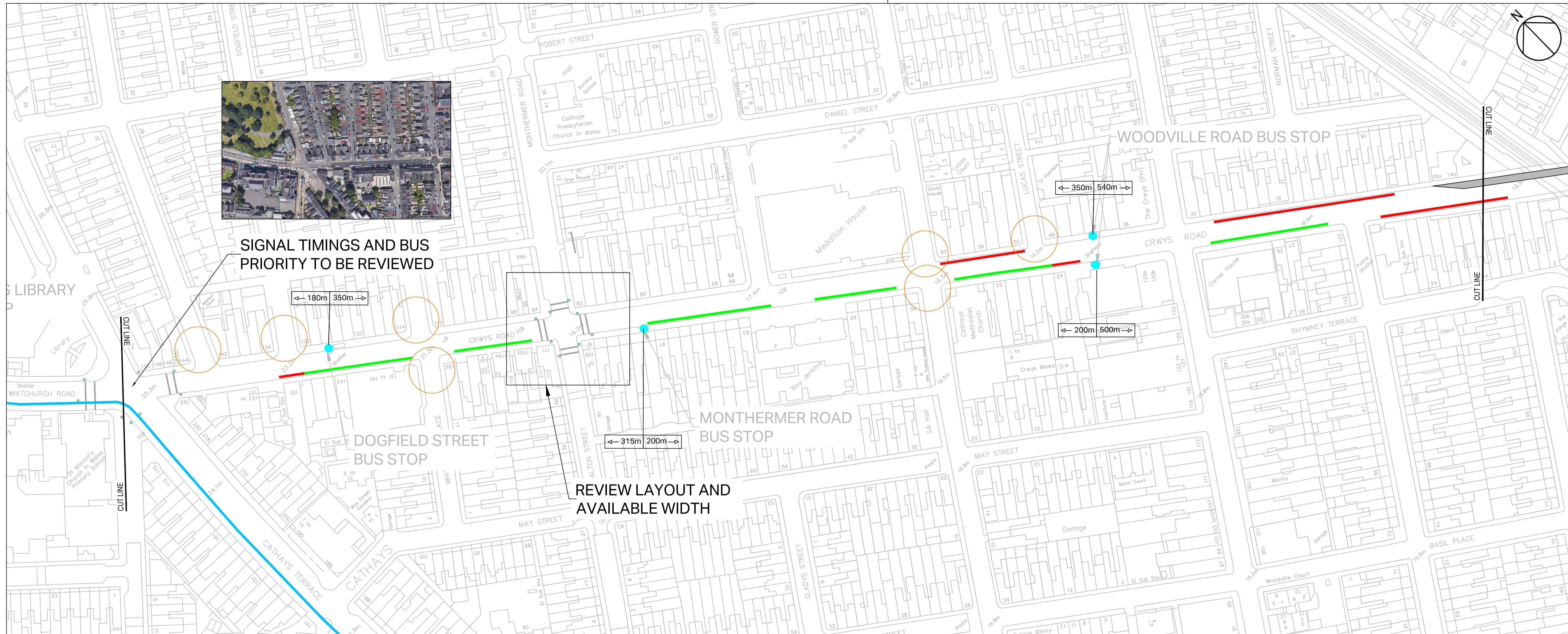
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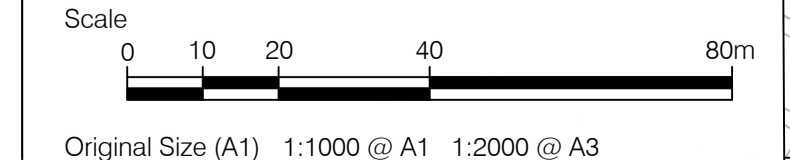
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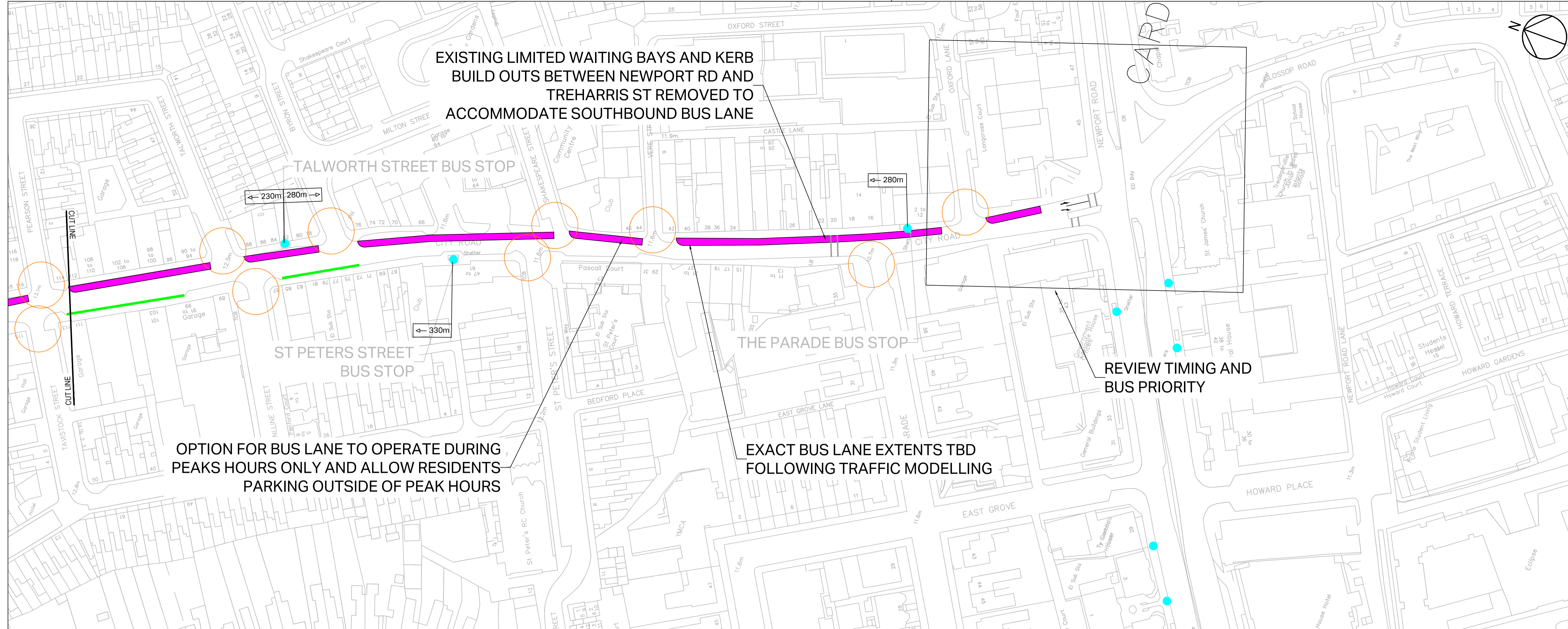
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	Type	Role	Number





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THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

KEY

- PROPOSED BUS LANE
- EXISTING BUS LANE
- PROPOSED BUS STOP
- EXISTING BUS STOP
- CONTINUOUS FOOTWAY SIDE ROAD TREATMENTS
- GUARD RAIL TO BE REMOVED
- EXISTING CROSSING
- PROPOSED CROSSING
- EXISTING TRAFFIC SIGNAL
- EXISTING CYCLEWAY
- IMPROVED KERBSIDE CONTROL
- EXISTING ON STREET PARKING
- PROPOSED BUS STOP SPACING
- EXISTING BUS STOP SPACING

MINOR AMENDMENTS	JP	08.01.24	P02
REVISION DETAILS	By	Date	Suffix
Purpose of issue			

Client



CARDIFF
CAERDYDD

Project Title

CARDIFF BUS ROUTE ENHANCEMENTS

Drawing Title

**ROUTE 2 NORTH
GENERAL ARRANGEMENT
SHEET 3 OF 3**

Designed	Drawn	Checked	Approved	Date
AW	HD			22/09/23
Internal Project No.		Suitability		
60689391				
Scale @ A1	Discipline			
1:1000	Civil - Streets			

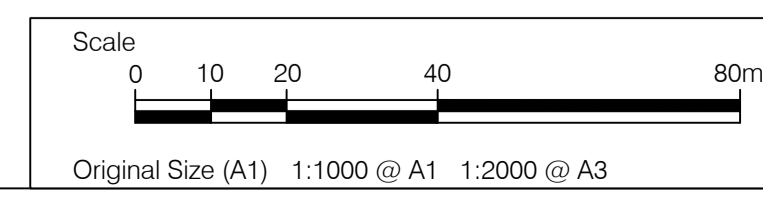
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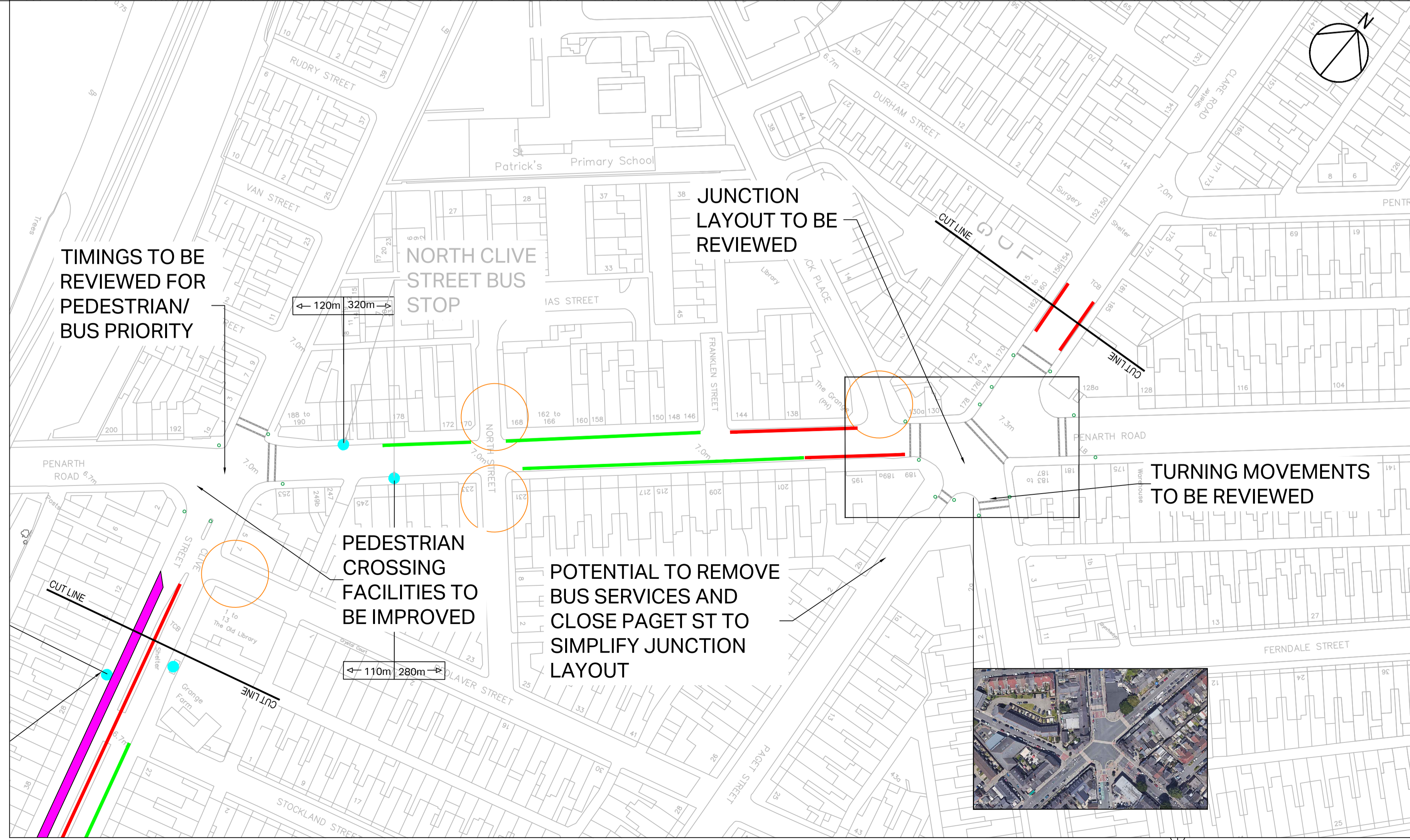
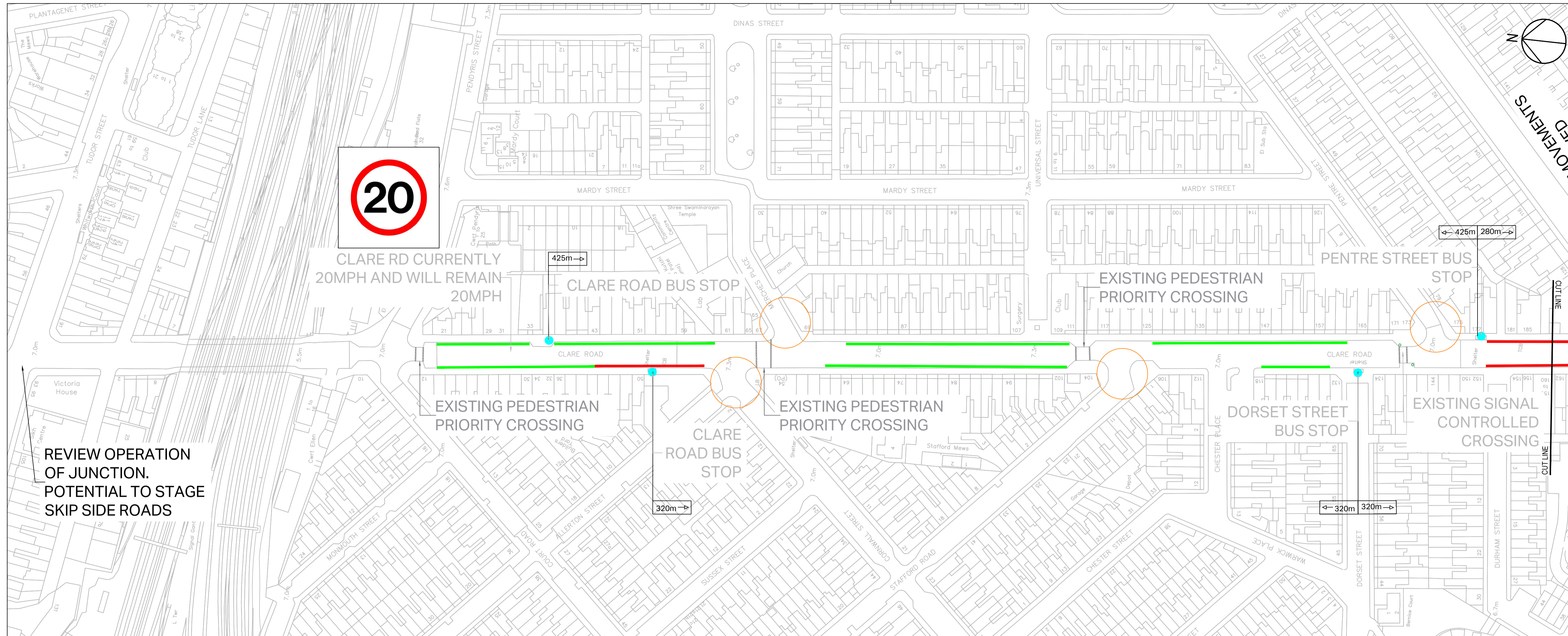
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				P02
Location	I Type	I Role	I Number	





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KEY

- PROPOSED BUS LANE (Pink line)
- EXISTING BUS LANE (Grey line)
- PROPOSED BUS STOP (Green circle)
- EXISTING BUS STOP (Blue circle)
- CONTINUOUS FOOTWAY SIDE ROAD TREATMENTS (Orange circle)
- GUARD RAIL TO BE REMOVED (Blue line)
- EXISTING CROSSING (Dashed line)
- PROPOSED CROSSING (Dashed line)
- EXISTING TRAFFIC SIGNAL (Green circle)
- EXISTING CYCLEWAY (Blue line)
- IMPROVED KERBSIDE CONTROL (Red line)
- EXISTING ON STREET PARKING (Green line)
- PROPOSED BUS STOP SPACING (Arrow with 1.00m)
- EXISTING BUS STOP SPACING (Arrow with 1.00m)

MINOR AMENDMENTS	JP	08.01.24	P02
REVISION DETAILS	By	Date	Suffix
Purpose of issue	Check		



CARDIFF BUS ROUTE ENHANCEMENTS

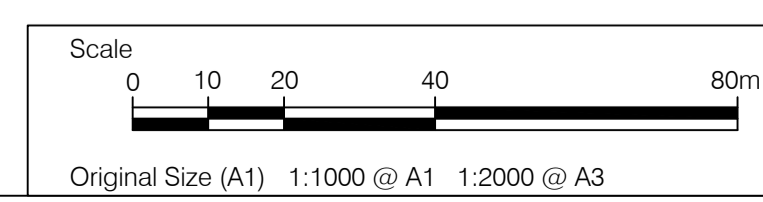
ROUTE 2 SOUTH GENERAL ARRANGEMENT SHEET 1 OF 2

Designed	Drawn	Checked	Approved	Date
AW	HD			22/09/23
Internal Project No.	Suitability			
60689391				
Scale @ A1	Discipline			
1:1000	Civil - Streets			

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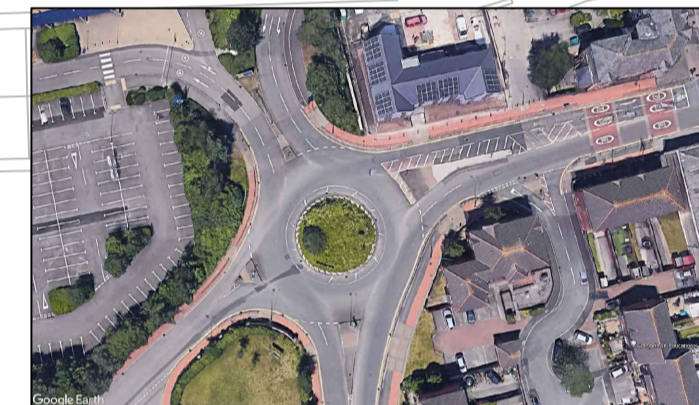
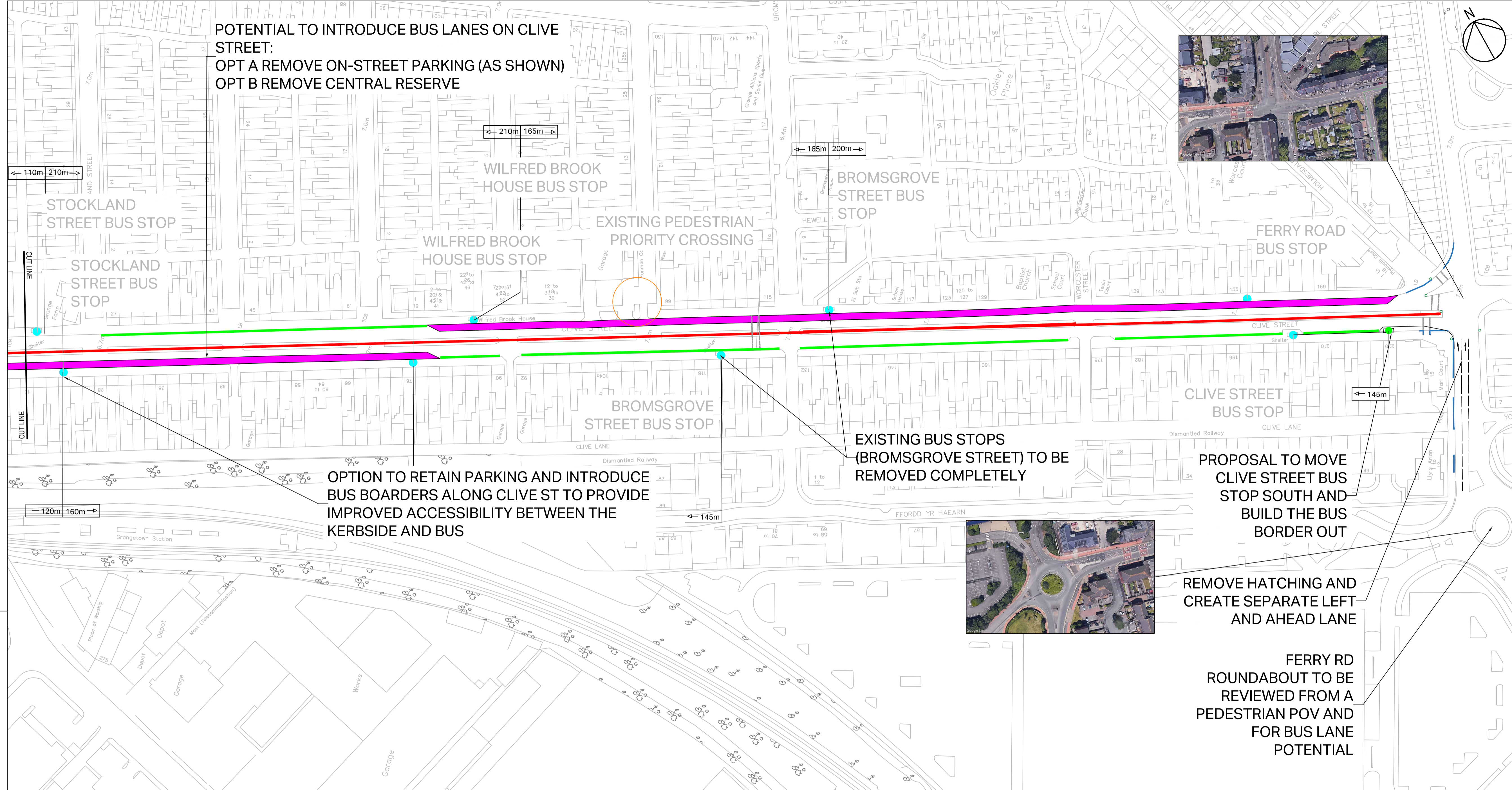
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Cardiff CF10 5BT

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Drawing Number	Work Package ID	1 Originator	1 Volume	Rev
				P02
Location	I Type	I Role	I Number	

POTENTIAL TO INTRODUCE BUS LANES ON CLIVE STREET:
 OPT A REMOVE ON-STREET PARKING (AS SHOWN)
 OPT B REMOVE CENTRAL RESERVE



OPTION TO RETAIN PARKING AND INTRODUCE BUS BOARDERS ALONG CLIVE ST TO PROVIDE IMPROVED ACCESSIBILITY BETWEEN THE KERBSIDE AND BUS

EXISTING BUS STOPS (BROMSGROVE STREET) TO BE REMOVED COMPLETELY

PROPOSAL TO MOVE CLIVE STREET BUS STOP SOUTH AND BUILD THE BUS BORDER OUT

REMOVE HATCHING AND CREATE SEPARATE LEFT AND AHEAD LANE

FERRY RD ROUNDABOUT TO BE REVIEWED FROM A PEDESTRIAN POV AND FOR BUS LANE POTENTIAL

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX
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- GUARD RAIL TO BE REMOVED
- EXISTING CROSSING
- PROPOSED CROSSING
- EXISTING TRAFFIC SIGNAL
- EXISTING CYCLEWAY
- IMPROVED KERBSIDE CONTROL
- EXISTING ON STREET PARKING
- PROPOSED BUS STOP SPACING
- EXISTING BUS STOP SPACING

MINOR AMENDMENTS	JP	08.01.24	P02
REVISION DETAILS	By	Date	Suffix
Purpose of issue			



Client
CARDIFF BUS ROUTE ENHANCEMENTS

Drawing Title
ROUTE 2 SOUTH GENERAL ARRANGEMENT SHEET 2 OF 2

Designed	Drawn	Checked	Approved	Date
AW	HD			22/09/23
Internal Project No.		Suitability		
60689391				
Scale @ A1		Discipline		
1:1000		Civil - Streets		

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Drawing Number	1 Originator	1 Volume	Rev
Work Package ID			P02
Location	1 Type	1 Role	1 Number

