Dover Western Docks Revival

Business Case for A20 Junction Improvements

KCC LEP scheme no.22

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Executive Summary

Dover has entered the most important period of redevelopment since the Second World War which will fundamentally transform its Port, seafront and town. The Port is committed to development for the nation but with the community at its heart by ensuring long term port capacity, transformation of the waterfront, celebrating and developing heritage assets and bringing the port and town closer together.

Today, Dover is a transit town, but 'Destination Dover' can and will be achieved by capturing the value of the 13 million passengers that pass through it, delivering the catalyst for regeneration at the waterfront and creating one Dover through enhanced port-town connectivity and the realisation of a shared vision. All this whilst delivering resilient 24-hour operations 364 days a year with 120 ferry movements and 10,000 trucks per day that deliver 17% of the UK's trade in goods annually. With 13 million passengers per year, in passenger terms, if it were an airport, the Port of Dover would be the UK's 5th busiest.

Underpinning this resilience and success is the fluid movement of vehicles to and from the Port which coexists on a daily basis with other traffic in and around Dover and that is the key element within this business case for funding from the SE LEP.

This business case is as unique as the Port of Dover in that it is equally essential for its community and the nation. The Port's Dover Western Docks Revival (DWDR), which encompasses the regeneration of the western docks and waterfront to deliver 'Destination Dover', is fully aligned to Dover District Council's (DDC) Local Development Framework (LDF) Core Strategy and the delivery of new homes along with Dover Town Investment Zone (DTIZ) – now named St James – for the town centre regeneration. Together these developments represent a transformation unseen in 70 years.

Together these will deliver a new future for Dover and one of the first steps towards bringing the pieces together is changing the junction layout of the A20 which runs from the Western Docks to the Ferry Port at the Eastern Docks. Alongside its strategic importance, this route is a key access point to both the waterfront and the town as well as a pass through for traffic to the new homes planned in Dover and in the wider District.

The redesign of the two new junctions in this case will accommodate the additional traffic expected with reduced delays per vehicle through a signalised network that will be linked to the DWDR and St James development generating an economic benefit to all users that would not be possible under the old layout.

Dover's renaissance hinges on the developments taking place and all three are already in progress. As of 13th December 2016[1], St James' permanent works have already commenced and terms are being finalised with a new contractor.

The build of new homes in Dover, although behind plan in 2014/15, is still focused on meeting the target by 2026 and this was borne out as the Dover District saw a 15-year high in net additions to dwelling stock in 2015-16 with 726 new homes[2]. This included 648 new

[1] https://www.dover.gov.uk/News/Press-Releases/2016/Progress-At-Dover-St-James.aspx
[2] https://www.dover.gov.uk/News/Press-Releases/2016/New-Homes-Reach-15-Year-High-In-Dover-District.aspx

build homes as Dover District Council's strategy to improve the range and quality of housing starts to deliver, with work underway on many of the sites identified for the district's strategic housing allocations.

The core traffic scenario adopted in this case is built around full delivery of DWDR and DTIZ/St James by 2026, with the LDF housing prudently reduced to 50%. This is essentially due to the near certain probability of these local project outcomes (mitigated in quantity terms for the LDF housing). Additional modelling, excluding the DWDR and other Port traffic increases, has also been included.

This is a critical time for Dover and for its one-off regeneration opportunity to be maximised and fulfilled.

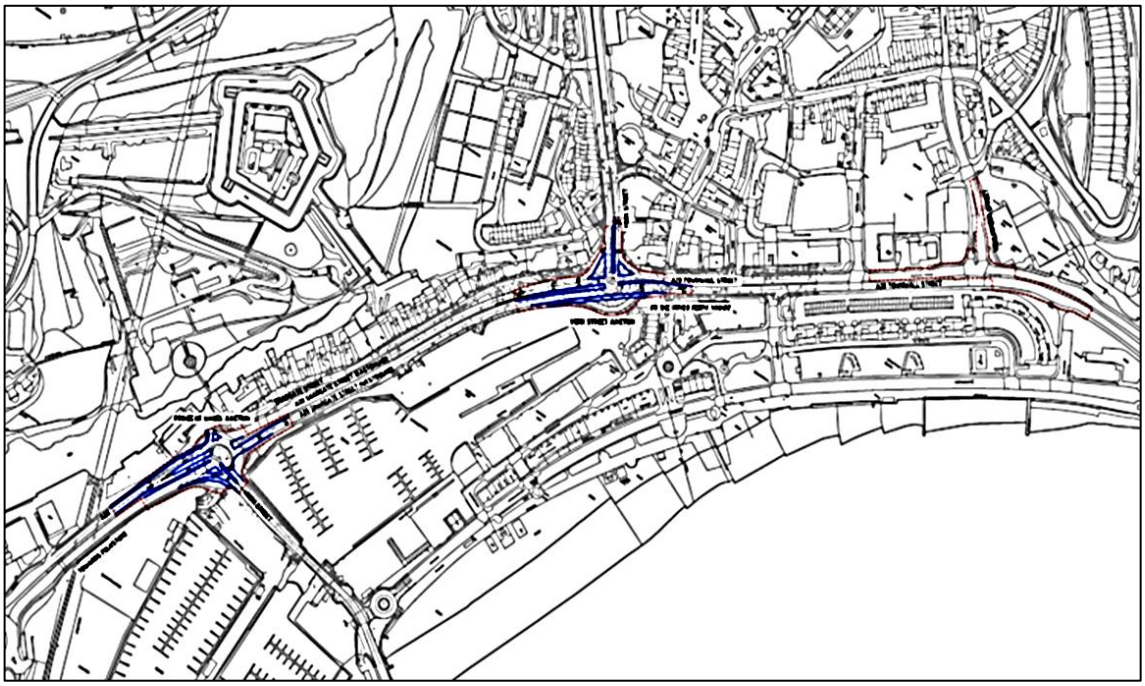
1 Introduction

1.1 Overview

The overall purpose of this report is to provide justification for the 2016/17 funding allocated to KCC LEP scheme no.22 for the Dover Western Dock Revival (DWDR). This specifically relates to improvements to the A20 junction which will facilitate wider regeneration in and around the seafront.

The bid is for £5 million to remodel two roundabouts (Prince of Wales and York Street) located on the A20 adjacent to the Western Docks in Dover to reconfigure into two traffic signal controlled junctions. These will promote free flowing traffic along the A20 in order to support major housing growth and town centre regeneration (Dover Town Investment Zone) in Dover as well as enable traffic movements in and out of the Western Docks.

The funding is for the A20 junction improvements which is state aid compliant, but there is considerable focus in the business case on the wider DWDR programme and the regeneration of the seafront. Additionality is from the early delivery of the marina pier within DWDR.



1.2 Background to the business case

Dover is the busiest ferry port in Europe handling £119 billion of trade, representing 17% of the UK's trade in goods. Together, the Port with Eurotunnel and Eurostar, handle 33 million passengers, equivalent to the 3rd busiest UK airport behind only Heathrow and Gatwick.

Throughout the last decade until 2007, freight vehicle traffic was growing at a significant rate, peaking at 13.5% in 2006 and brought annual freight volumes to 2.3 million.

Government at the time, through its Ports Policy Review Interim Report, highlighted a 101% growth forecast for roll on-roll off ferry traffic by 2030, stating that "This suggests that, in the absence of new development or large efficiency improvements over the coming decade, constraints would be in……roll-on roll-off terminal capacity in the South East, serving short-sea routes to the Continent." Such rapid freight increases and forecasts caused the Port to develop a 30-year master plan in order to address such growth.

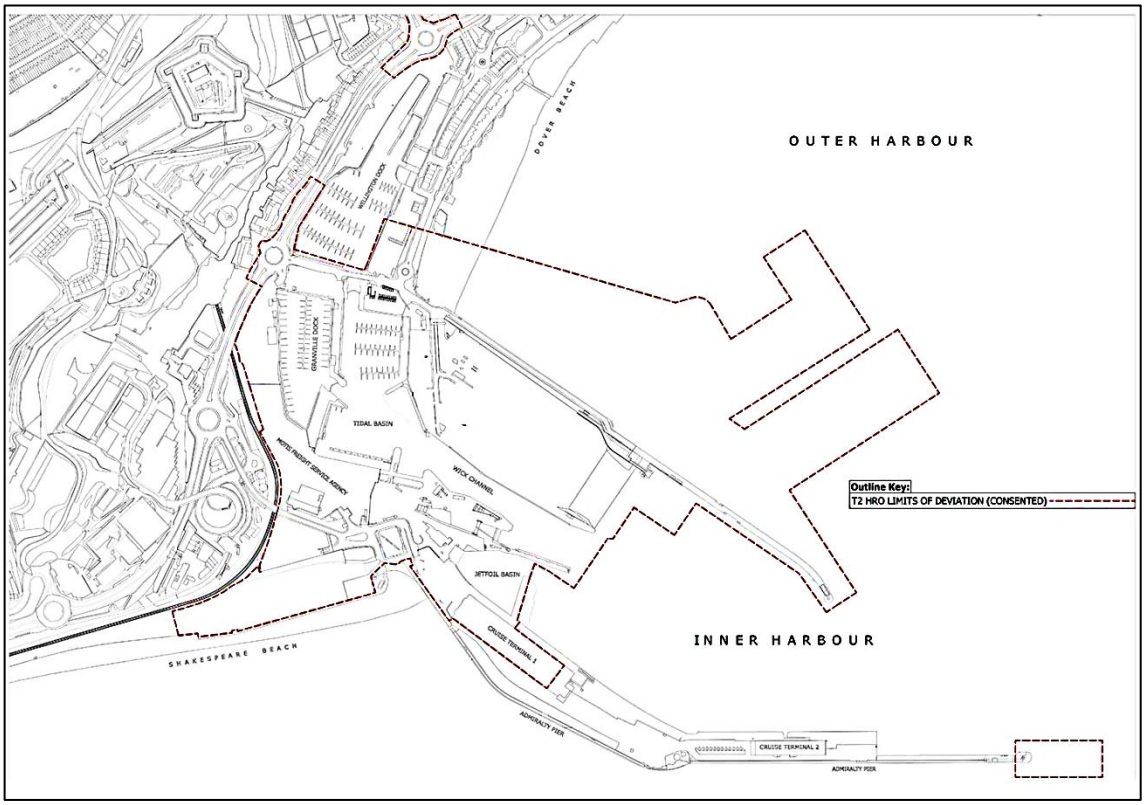
During the process, work was undertaken to assess capacity in the Eastern Docks, home to the ferry operation, including berth capacity, manoeuvring capacity in the harbour, landside capacity and external road capacity. The results concluded that whilst the Eastern Docks could provide an incremental increase in capacity over time, it could not provide the required step change in capacity that was at the time forecast to be required and within the timescale needed.

Therefore, the master plan concluded that the Port should pursue the development of a second ferry terminal in the Western Docks in order to provide the step change in capacity to meet such demand. Known as Terminal 2, the c. £380 million development was designed to deliver four large ferry berths, border controls, check-in, assembly space and road infrastructure, effectively matching the footprint of the existing ferry terminal.

It was also identified that the development would provide an unprecedented opportunity to kick-start the regeneration of the town of Dover, attracting inward investment, creating jobs and improving the waterfront area. An iconic waterfront transformation element was also included with the proposed development of a new marina. Along with Terminal 2, the waterfront development opportunity became a key part ('strategic allocation') of the Local Development Framework Core Strategy for Dover district, described as the highest profile site in the district with the potential to lead in the creation of a powerful modern image and visitor destination for Dover, Terminal 2 being the catalyst.

In order to facilitate the needs of the second ferry terminal, waterfront development and Dover town regeneration, changes to two of the junctions on the A20 were proposed. Thus changing the Prince of Wales and York Street roundabouts to signalised junctions on the A20.

Having completed the master planning exercise, quoted as an exemplar by the Department for Transport, the Port applied for consent to deliver the scheme through a Harbour Revision Order (HRO). The HRO was granted in 2012 by the Department for Transport with no objections received from members of the public, which was exceptional for a scheme of this scale and within a sensitive heritage environment.



As part of the process to obtain consent, the Port was required to enter into a legal agreement with Dover District Council (DDC) in order to deliver certain enabling works, considered to be important to the regeneration ambitions of the Council.

1.3 The A20

The A20 in Dover is a shared space, providing the primary strategic signed route to/from the Port as well as fulfilling the role as part of the local gyratory system around Dover. This is a challenging context and means that any changes to the road must address both local and strategic requirements.

As part of the Terminal 2 process, the Port established a Transport Topic Group to examine the transport assessment, which also used Dover District Council's Transportation model as its baseline. The Port used detailed traffic modelling, known as VISSIM, to demonstrate the impact of the scheme and this was verified by Parsons Brinkerhoff on behalf of the Highways Agency (now Highways England). Participants in the group were Highways Agency, Kent Highway Services, Dover District Council, Parsons Brinkerhoff (consultant for Highways Agency) and Halcrow (consultant for Port of Dover).

With major town centre regeneration plans being considered at the time (now being delivered), the modelling also had to take into account the impacts of Dover Town Investment Zone (known as St James' Development) and the district council's plans to create

10,000 new houses in Dover (notably at Whitfield). Recently, 6,000 have been approved to build. The modelling clearly illustrated that the extra local traffic movements generated by the town centre and Whitfield developments would create the need for new junctions on the A20 in Dover, let alone the Port's own requirements to facilitate a significant increase in ferry traffic via Terminal 2.

At that time 5 options were being considered for T2 were:

1. Grade Separated Access from A20
2. Grade separated access Junction on A20 with 2 lanes
3. Signalised Access Junction on A20
4. Combined Signalised and Grade separated Access
5. Potential Ingress / Egress from Limekiln Roundabout

A hybrid option of a grade separated junction into the Terminal 2 development whilst replacing the Prince of Wales roundabout with a signalised junction was deemed to have the most merit. At the point that T2 was replaced by DWDR, the Prince of Wales roundabout changes to a signalised junction remained.

The signalised junctions at York Street were agreed with DDC as part of the legal agreement and determined to be the most suitable layout to network with their town regeneration plans.

The table below is taken from the Dover Development Plan Terminal 2 Environmental Statement produced in 2009 and identifies consistent growth throughout Dover and 16-17% along the A20 without the T2 terminal:

Assessment Link	Average Annual Daily Traffic			Traffic Growth 2014-2026		% Growth 2014-2026	
	2014 w/o T2	2026 w/o T2	2026 with T2	Non T2	T2	Non T2	T2
Old Folkestone Road	3,088	3,486	3,486	398	0	13%	0%
South Military Road	2,282	2,575	2,575	293	0	13%	0%
Channel View Road	2,248	2,523	2,523	275	0	12%	0%
The Viaduct	2,067	2,320	2,320	253	0	12%	0%
York Street btw York Street RAB & Queen Street	16,998	19,141	19,282	2,143	141	13%	1%
York Street btw Queen Street & B2011	17,098	19,254	19,395	2,156	141	13%	1%
A20 west of Archcliffe Road	42,443	49,361	56,393	6,918	7,032	16%	17%
A20 btw Archcliffe Road RAB & Limekiln RAB	39,178	45,566	52,599	6,388	7,033	16%	18%
A20 btw Limekiln and Prince of Wales	39,900	46,486	53,518	6,586	7,032	17%	18%
A20 btw Prince of Wales and York Street	35,140	41,009	41,207	5,869	198	17%	1%
A20 btw York Street and A256	33,342	38,883	39,597	5,541	714	17%	2%
A20 btw A256 and A2	32,439	37,867	38,637	5,428	770	17%	2%
A2 Jubilee Way	28,834	36,232	39,222	7,398	2,990	26%	10%
Maison Dieu Road btw A20 & A258	7,873	8,884	9,119	1,011	235	13%	3%
Maison Dieu Road north of A258	2,714	3,062	3,203	348	141	13%	5%
Castle Hill Road	6,224	7,020	7,144	796	124	13%	2%
Kings Street/Queens Street	1,096	1,235	1,235	139	0	13%	0%
Castle Street	3,280	3,700	3,700	420	0	13%	0%
Union Street	4,437	4,437	8,929	0	4,492	0%	101%

1.4 Recession and the Eastern Docks

Following the pre-recession traffic peak in 2007, the following two years saw a plateauing of freight traffic growth followed by a decline in freight volumes through to 2012 when volumes were less than 2 million (1.9m) freight vehicles.

The severity of the recession and the impact on traffic volumes during this period gave the Port good cause to revisit its master plan in order to see whether the step change in ferry capacity was still the right way forward.

Following a review of the master plan, the Port concluded that it now had the required breathing space to build up capacity in the Eastern Docks to meet traffic demands in the short to medium term.

The Eastern Docks plan centred on creating an additional holding area inside the Port at the Eastern Docks Ferry Terminal with a flexible capacity to assemble up to 220 freight vehicles (equivalent to almost four kilometres of traffic). Known as the Traffic Management Improvement Project, alongside the extra capacity, it was designed to remove bottlenecks in the Port with traffic flows being re-routed and intelligently managed using variable lane messaging and control.

The TMI project commenced in 2012, was completed at the end of 2015, and has already significantly improved the resilience of the Port operation. It will also help manage the throughput of traffic within the confines of the Port and reduce congestion on the external road network.

The Port also carried out a programme of berth renewals in order to ensure that its berths had the latest safety and operational standards. This has enhanced reliability and efficiency to give ferry operators the advantage of reducing time in port, supporting published sailing schedules and maximising fuel economies when crossing the Channel.

The Port committed £85 million to the upgrade of the Eastern Docks. These works were concluded by 31 December 2015 having spent a total of £87.6 million.

1.5 Dover Western Docks Revival

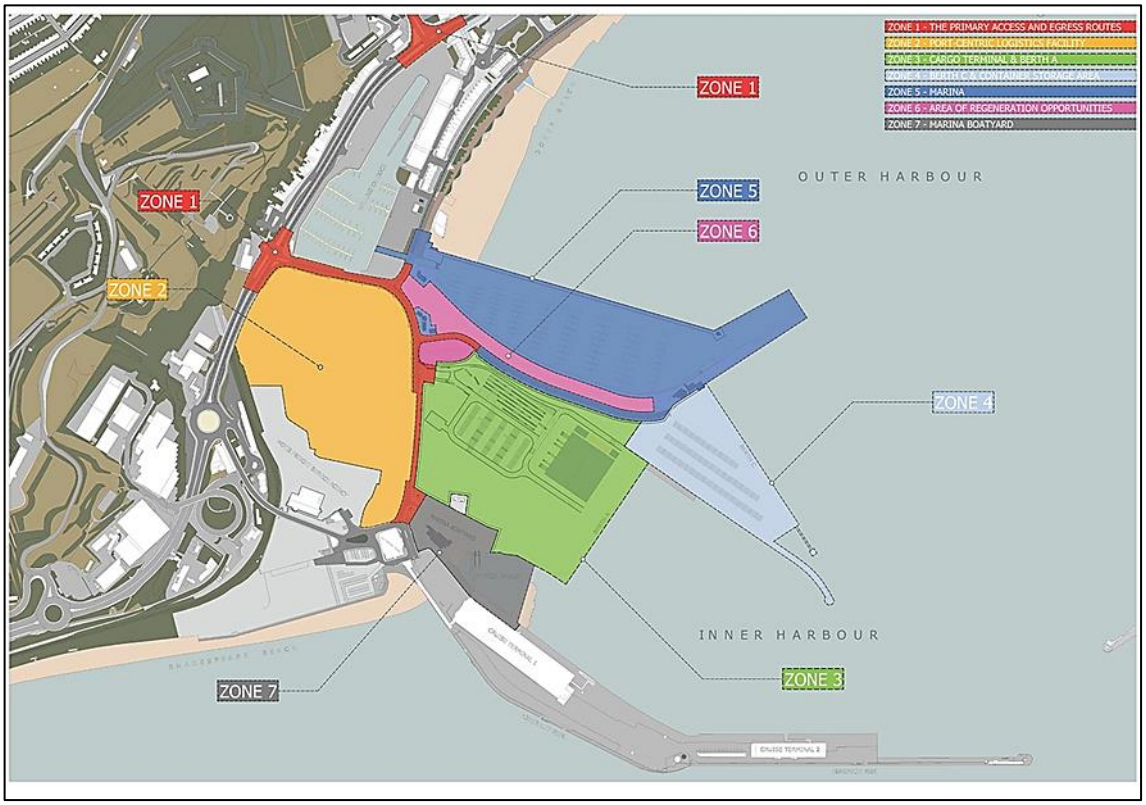
Whilst delivering capacity improvements in the Eastern Docks, the Port continued to look at opportunities to develop the Western Docks, utilising the HRO granted in 2012, in order to protect long term port capacity and deliver some of the key benefits of the Terminal 2 scheme. In 2014, the Port launched Dover Western Docks Revival (DWDR), the biggest single investment project the Port has ever undertaken.

http://www.doverport.co.uk/dwdr/

This represents a significant opportunity to enhance the contribution and operation of a key international transport gateway and provides the transport blueprint to enable and support Dover's wider growth agenda over the coming decades. The project consists of:

- Development of the footprint of the Western Docks to protect long term port capacity.
- Re-location of the cargo operation to Western Docks.
- Development of a new cargo terminal and port centric distribution facility.
- Creating over 600 new jobs and safeguarding another 148 jobs at the Port of Dover.
- Opportunity to further increase ferry capacity as the Eastern Docks becomes dedicated solely to the ferry business.
- Junction improvement works designed to support Dover's growth status and town centre regeneration.

- Enabling waterfront transformation: development of a new marina; construction of a new bridge and a new four lane road link.
- Catalyst for seafront regeneration.



DWDR will initially deliver substantial landside infrastructure and a new refrigerated cargo terminal. This will provide much needed quality employment opportunities for local people.

By developing the Western Docks, the Port is able to move its general cargo operation out of the Eastern Docks and as a result create a dedicated ferry terminal. This provides further opportunity to create additional holding capacity for freight vehicles within the Eastern Docks and improve the efficiency of the operation, which will not be interrupted by the cargo business. Such additional capacity could deliver around another six kilometres of freight vehicle space within the Ferry Terminal, delivering 10km in total along with the existing TMI project. Such developments together represent an increase over existing capacity of some 50%, a significant amount and a sign of the lengths the Port is going to in order to provide adequate capacity both to handle growing freight volumes and to provide further headroom at times of operational stress.

Currently, the Port of Dover handles up to four cargo ship movements per week, each one of them restricting ferry movements in the Port for up to an hour each time on both entry and departure. With the number of cargo ships currently handled per week, the high intensity ferry operation is affected for around eight hours per week in total. DWDR, through better vessel traffic management, will therefore remove up to eight hours of disruption per week to the ferry operation whilst also providing space for a future ferry berth when volumes demand it and the additional assembly space for freight vehicles.

2 Strategic Case

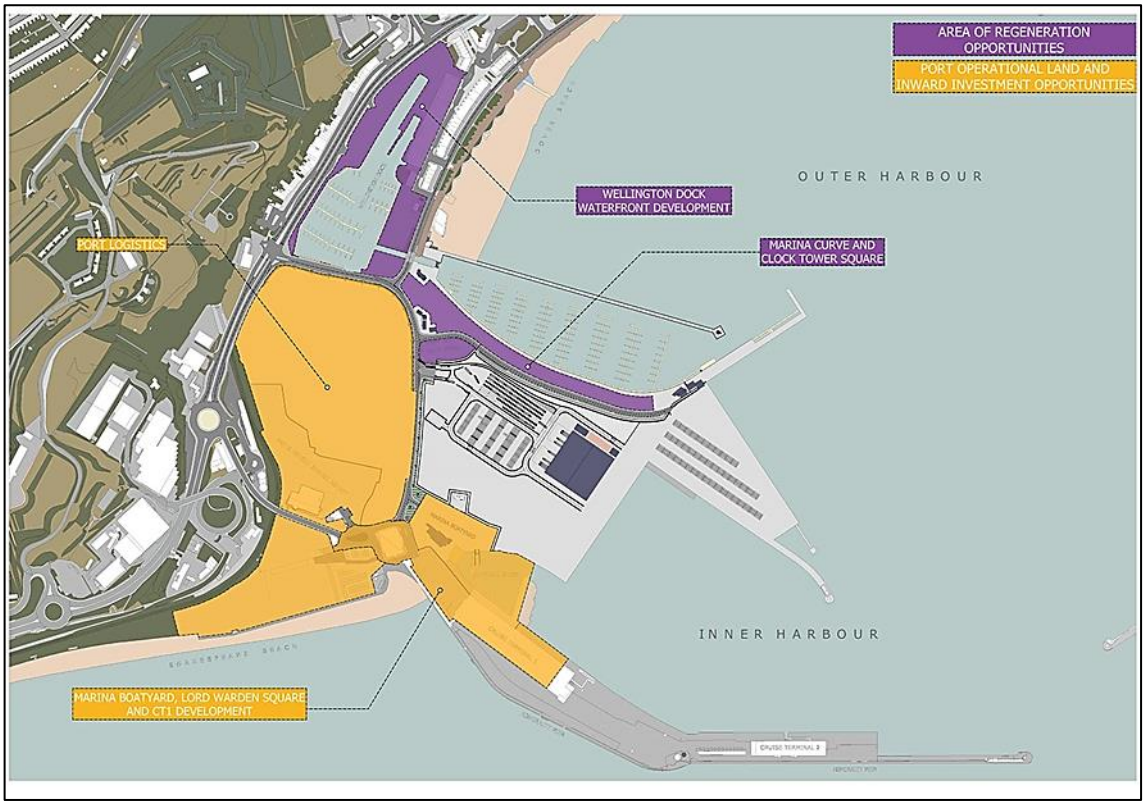
2.1 Overview

The Strategic Case outlines the overarching reasons for proposing the changes to the A20 in terms of its contribution to improving local transport and making it suitable for the planned future developments to the town of Dover and its Port.

The redevelopment of the A20 network is the first step towards developing the Port for the nation with the community at its heart. This will be achieved by ensuring the long term port capacity, transformation of the waterfront, celebrating and developing heritage assets along with the connectivity of the seafront with the town.

2.2 Strategic context

DWDR is focused on protecting the long term port capacity and future resilience of one of the UK's (and indeed the region's) key international transport gateways, through the early development of the approved consented footprint in the Western Docks. This would revive the Western Docks and the Port's overall contribution to UK growth and resilience but, through existing agreements required by the Highways Agency and Dover District Council as part of the approval, also delivers key local junction capacity improvement works. The relocation of the marina as part of these works to the seafront, creates a focal point for redevelopment and regeneration of the seafront and the Wellington Dock with mixed use retail, leisure and residential spaces.



The scale of DWDR requires a significant level of infrastructure and construction investment with returns that will be generated over the long term. As is common with projects of this nature, there are some uncertainties over the investment returns as the project involves a high level of upfront investment in infrastructure and site preparation works.

2.2.1 Contribution to local priorities

The initial A20 improvement works will support the delivery of Dover District Council's Local Development Framework (LDF) Core Strategy regarding major housing growth (at least 10,100 new homes by 2026) as well as a key town centre regeneration project – Dover Town Investment Zone (DTIZ). Alongside this, the works will also accommodate the residual increase in port traffic generated by DWDR. The improvements provide a general uplift in capacity for increased numbers of vehicles which will result from the growth from all the background development included in the LDF. In particular, the York Street and Union Street arms are given a better opportunity for traffic to turn, enter and exit from the Trunk Road. Without these improvements traffic will just queue back and lead to on-going congestion, thus discouraging investors and businesses to locate in Dover.

Simply put, the A20 improvements will facilitate more traffic throughput in the peak period, less delays and less queuing leading to a better, more vibrant place to live in, visit and do business in. This statement is backed by the traffic model developed jointly with Dover District Council and Highways Agency as part of the planning process.

With the change to local junctions on the A20 through Dover at Union Street and York Street for the reasons described above, this also changes the required access arrangements for a number of local seafront businesses, tourists and residents. In order that the junction works do not force seafront traffic to head to the far end of Dover (at Aycliffe) in order to reach the first point where it can turn round (which would be highly detrimental to seafront businesses), such traffic requires the ability to access the A20 via Union Street. This will be delivered in 2019. Following the junction improvements, subsequent work includes widening Union Street to four lanes to improve the access and egress from the Waterfront. The Seafront access road would be realigned and a new bascule bridge introduced over the navigational access which connects the two marina areas.

This in turn enables these key local businesses to function and grow within the context of plans for a regenerated waterfront, viewed within the LDF Core Strategy as the catalyst for Dover's wider regeneration.

In addition, key to waterfront development is a new landmark marina on the seafront alongside the existing Prince of Wales pier and connecting to the listed heritage Wellington Dock. This marina will enhance the waterfront experience providing a modern and attractive marina which will attract more permanent berth holders and visitor yachts. An attractive curved pier out into the harbour will provide the opportunity for leisure businesses (cafes, bars, restaurants and shops) to attract visitors to the seafront and help create "destination Dover". In turn this will build interest in the town and so be an enabler for further residential and retail development around the Wellington dock and seafront area which will be further

complimented by the planned retail and leisure redevelopment at St James by Dover District Council. This new marina will be delivered in 2018 and 2019.

Transforming the Western part of the Port therefore plays a key role in supporting the wider transformation agenda for Dover which will enable the creation of 1,685 jobs (including 600 direct new jobs and 148 more safeguarded at the Port of Dover) for local people, delivering the transport infrastructure required to support housing growth and facilitating a massive boost to the local economy in a place with severe pockets of deprivation within the South East.

Planning permission was granted through the HRO in 2012 and the A20 works commenced in February 2016. Kent County Council, Dover District Council, the local community, Kent & Medway Economic Partnerships and the Department of Transport expressed support when the scheme was presented to them.

2.2.2 Initial traffic modelling - the local traffic benefits

The Port commissioned an two updates to the A20 network traffic modelling in order to estimate the benefits to the growing number of road users expected on it between 2015 and 2026. The initial traffic modelling in in appendix C was followed by a further revision (appendix G) with supplementary information included in appendix H – the revised traffic modelling makes up the basis for the NPV calculations.

The traffic modelling has been carried out by Transport Planning & Highways Solutions (TPHS) using VISSIM which was initially undertaken for the Terminal 2 proposals. This was validated by the Highways Agency (as then known) for the HRO and the updated model in 2015 passed with regard to the WebTAG guidance and how subsequently it has been used to test a number of planned scenarios relating to the current works along the A20 in agreements with both Highways England and their consultants (Atkins).

The initial modelling focusses on an average day between the peak hours of 16:30 and 21:30 which equates to over 25% of the traffic on the network in a day.

From this the average delay in seconds per vehicle is predicted to reduce from 905 seconds (model run 1A) in 2015 to 669 seconds (model run 3C) as traffic through the network over the modelled period grows from 13,000 to 26,000.

Whilst traffic flows double in this period, the total time lost to delays only increase by less than 50% and results in a 1,700 hours saved benefit per day to road users from the 2015 baseline.

The Port has used 2026 in its modelling as this links in to local government plans for the LDF and includes the full impact of the DTIZ. It would be possible to extrapolate benefits beyond 2026 if required, but the evidence shows that the impact has already repaid the initial investment within the current model.

The model run 2A doesn't appear to show an immediate benefit to the system as a result of the junction redevelopments. One of the key factors to this is the current positive impact of the Dover Traffic Assessment Project (TAP) which controls the flow of HGVs from the A20 through Dover by filtering Port traffic at the Aycliffe roundabout. The model doesn't identify

the impact from the junction redevelopments on TAP, which the Port will be monitoring closely once the A20 junctions are complete. It is expected that the improvements will result in reduced durations of TAP at peak times as the new network is able to manage with more vehicles passing through it so reducing disruption into this final stretch of the A20 to the Port.

2.2.3 LDF and DTIZ traffic model

The majority of the extra 13,000 vehicles from the 2015 model to the 2026 one – almost 8,000 (or approx. 60%) – comes from the LDF and DTIZ along with Western Heights and Farthingloe despite the traffic generated from LDF being reduced to only 50% in the model. Of the Port generated growth, up to 3,000 will come from DWDR relating to the seafront regeneration leaving a relatively small proportion from the operational Port-based traffic for ferry and cargo terminals.

TPHS ran a scenario to exclude all vehicle growth generated by DWDR and the Port so as to show the individual benefits that could be determined from local government objectives alone.

This option 3B, generated a lower average delay time of 622 seconds per vehicle which – using the same methodology above – demonstrates that the junction improvements would be necessary and beneficial. It would therefore be appropriate to fund from public monies via the SELEP as the junctions would be needed were there no increase of Port or DWDR traffic

2.2.4 Revised traffic modelling - future scenario with old junction network

Assessing the potential performance of the old junction network – i.e. roundabouts at both the Prince of Wales and York Street junctions – has been incorporated within the downside case for the Net Present Value comparisons.

Within this additional modelling, carried out by TPHS, the model presents the rush hour scenario when the junctions would be most challenged by traffic flows. It has also been adjusted to represent a more realistic increase in flows from TAP required to maintain the queueing and delays prior to TAP.

The risk within the earlier modelling – outlined in section 2.2.1 and 2.2.2 – is that it hasn't increased the flows from TAP as volumes increase so improved network performance between TAP and the Eastern Docks will at times be offset by increased delays for traffic heading to Dover prior to TAP.

In addition, earlier modelling would have encountered significant delays skewed by TAP as some traffic would be stopped and held prior to the Western Heights roundabout. This was caused by fewer releases per hour within the initial model, the frequency of which have now been increased in order to accommodate future traffic growth towards the docks. Without increasing the rate of release from TAP in line with traffic growth, delays will increase with larger queues along the A20 from Folkestone.

Whilst the initial traffic modelling was useful to determine the drivers of future traffic volumes, the supplementary modelling gives a more robust approach to establishing, isolating and comparing the economic benefit of the junction improvements.

Scenario 1A is the 2015 baseline traffic flow and the model focuses on an hour between 16:30 and 17:30 – which would be a key rush hour period for the town. All future scenarios assume the same future position i.e. that DWDR, DTIZ/St James' Quarter and 50% of the LDF Housing are in place by 2026.

This business case is unique as it is focussed on the development of Dover. With the build of St James' already in progress and so linked to the A20 network of signals it is not practical to remove it from the model. Therefore the approach has been to ensure it is included in all the future scenarios that are compared, thus leaving the variation between the junction improvements along the A20 at Prince of Wales, York Street and Woolcomber Street.

The following table is taken from additional information provided by TPHS (see appendix H):

	MODEL RUN		
	1C	**5C**	3C
Average delay time / vehicle (secs.)	258	**274**	226
Average number of stops / vehicle	5	**5**	5
Average speed (mph)	16	**15**	17
Average stopped delay / vehicle (secs.)	61	**89**	80
Total delay time (hours)	562	**569**	490
Number of vehicles in the network	1177	**1191**	1021
No. of vehicles that have left the network	6668	**6273**	6785
Total stopped delay (hours)	134	**185**	173
Total travel time (hours)	1098	**1043**	996

Summary of Network Performance Statistics

The "do nothing" option is outlined by the comparison between scenarios 1C and 5C.

Scenario 1C: This is based on 2026 with traffic growth from DWDR, DTIZ/St James' and LDF (50%) but with the old roundabouts at Prince of Wales and York Street and current signals in place at Woolcomber Street.

Scenario 5C: This is based on 2026 with traffic growth from DWDR, DTIZ/St James' and LDF (50%) but with the old roundabouts at Prince of Wales and York Street and current signals in place at Woolcomber Street. The only junction development considered is within SJQ itself.

Outcome: Delays increase on average from 258 to 274 seconds per vehicle during rush hours.

Positive NPV: Never

BCR of 2: Never

The "do something" option is then the comparison between scenarios 5C and 3C.

Scenario 5C: As this is assumed to be the future position it becomes the start point for "Do Something"

Scenario 3C: This is based on 2026 with traffic growth from DWDR, DTIZ/St James' and LDF (50%) but with the new signalised junctions in place at Prince of Wales, York Street and Woolcomber Street as well as the new junction within SJQ (completing the network).

Outcome: Potential delays (from "do nothing") reduce on average from 274 to 226 seconds per vehicle during rush hours.

Positive NPV: 2030 (based on 58% HGVs) within range 2030-2032 (100% HGV to 100% car rates)

BCR of 2: 2035 within range 2034-2036

These outcomes are from a prudent approach which considers two rush hour periods experienced each weekday. The volumes of traffic within the NPV models grow incrementally each year up to 2026 and based on expected delivery years of DWDR, DTIZ/St James' and LDF housing. The benefits in time savings therefore increase in line with that trajectory.

The detailed hours and NPVs projected for each year can be found in appendices I to M.

To avoid overstating the time value for HGVs and cars (which is calculated at 58% HGV), NPVs were calculated on the basis of all HGV and all car traffic rates and the variation is small. The positive NPV and BCR of 2 are both within a 2 year range therefore are not very sensitive to potential variations in the future traffic mix.

Using a 30 year period the economic benefit NPV of the new A20 junctions is almost £24m (by the end of 2046).

It should also be noted that Dover TAP is currently a temporary traffic management system – https://www.gov.uk/government/publications/dover-traffic-assessment-project-tap – so a future scenario without this would lead to greater congestion and bring about the comparative benefits of the new network sooner albeit with greater traffic delays incurred overall. An additional level of resilience has been insured for Dover by replacing the old roundabouts as the new junctions can cope better with increasing volumes of traffic.

2.2.5 Addressing SELEP objectives & priorities

The expansion and re-development of Dover's port, town centre and waterfront has been agreed previously by the East Kent Regeneration Board, as one of the 12 priority investments for East Kent (as referenced in 'Open for Growth: The East Kent Growth Plan'). It was also referred to within the East Kent Local Investment Plan 2011-26.

The proposals for DWDR alongside the LDF will help deliver key objectives in the South East LEP Strategic Economic Plan (SEP). This plan sets out jobs and housing targets as priorities and a programme of investment aimed at building on the region's economic strengths and re-balancing its economy. Increasing the pace of housing construction and completion is a key strategic objective, the achievement of which will yield significant social and economic benefits. The Plan also highlights the importance of the visitor economy to the coastal areas and the opportunities to build on the LEP area's particular strengths in the creative, cultural and media sectors.

http://www.southeastlep.com/images/uploads/resources/SECTION_2_South_East_LEP_-_Growth_Deal_and_Strategic_Economic_Plan_WEB-2.pdf

The South East Growth Deal agreed with government also gives priority to much needed jobs and homes and is intended to act as a spur to the revival of the area's coastal towns. Within this there is commitment from the Department for Transport to work with the Local Enterprise Partnership to develop further the business case for the Dover Waterfront - Town Centre Links scheme, to identify more clearly the costs and benefits arising directly from it and also to understand better the inter-relationship with the Port's Dover Western Docks Revival scheme.

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/398874/30_South_East_Growth_Deal.pdf

The proposed DWDR project will help deliver the strategic objectives of the SELEP Strategic Economic Plan by accelerating the delivery of jobs and homes and through securing the comprehensive regeneration of one of East Kent's key identified strategic sites.

DWDR is also one of the key priorities in the National Infrastructure Delivery Plan 2016–21 from the Infrastructure and Projects Authority.

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/520086/2904569_nidp_deliveryplan.pdf

2.3 The case for change

The junction improvements fall out of the Dover Transport Model work and the requirement to meet the demands of significant housing growth as well as town centre regeneration whilst also delivering adequate access to the new cargo terminal and related activities. The Port was specifically required by Dover District Council and the Highways Agency to provide the junction improvements so that the Port's future activities could be accommodated alongside the major growth plans for Dover.

Specifically, in terms of the Port, Ro-Ro freight traffic volumes have more than doubled as a result of the efficiencies and capacity delivered by this system of transportation. Freight traffic is forecast to increase by 40% by 2030. Such growth requires the Port to protect its capacity, enhance and deliver short and long-term capacity requirements and to support the future resilience of this key international transport gateway. By moving the cargo business from Eastern to Western docks vital space is freed up in the Eastern dock to accommodate this increase in traffic flows.

Through the DWDR project, the congestion and air pollution level in the surrounding road network can be significantly reduced by re-routing traffic flows. Easy accessibility to businesses located on the waterfront can be improved which will encourage economic activity in the area.

The works will deliver the majority of the land required for the development of the western docks as permitted by the existing HRO given in 2012, thus safeguarding the development and significantly reducing the risk and cost associated with future consenting issues. The works will include the delivery of the marina and transport interventions, ensuring the Port can make a significant contribution to the regeneration of Dover at the same time as providing a much larger cargo facility with two berths (existing has one) and the capacity to deal with much greater volumes of cargo. This will safeguard 148 existing jobs and the creation of 600 new ones.

The whole project is key to the regeneration of Dover and the surrounding area. The transport element (junction improvements on the A20 and road changes on Marine parade) will facilitate further development of the town and traffic related to DTIZ (retail, hotel, leisure and housing).

http://www.dover.gov.uk/planning/regeneration/Dover-Town-Investment-Zone.aspx

2.4 Local engagement & community consultation

The Port of Dover – as promoter of the Dover Western Docks Revival (DWDR) project – has prioritised stakeholder community consultation from the earliest development stages, aware that the proposed changes need to be acceptable to and welcomed by the established Dover community and visitors, and with the Port's dedicated customer base across all its business streams.

Once the original T2 Masterplan for the harbour and seafront had started to take shape, the Port of Dover embarked on a series of key measures to engage with and consult the public. These included production of the following material:

- Planning for the Next Generation – Consultation Document (Mar 2006)
- Planning for the Next Generation – Second Round Consultation Document (Jan 2007)
- Planning for the Next Generation – Third Round Consultation Document (May 2008)
- Development Plan – A Regeneration for Port and Town (May 2008)
- Our Plan for the Next Generation – Ferry Terminal 2 (Feb 2010)

These introduced the Masterplan to the public, explained the rational for the project and included 'Frequently Asked Questions'. The Port then undertook extensive public engagement, numerous meetings and presentations, obtained news coverage and organised distribution of marketing material and advertising across the district.

This also included a number of Stakeholder Consultation Topic/Issue Groups, which included:

- Heritage/Historic Landscape: A Historic Environment/Landscape and Visual Impact Topic Group was set up to ensure that the views of the regulators were taken into account.

- Transport: A Transport Assessment Working Group was set up to agree the details of the assessment and discuss the outcomes.
- Regeneration: The initial Terminal 2 development provided a new marina which would create a seafront to focus to the regeneration plans. Thus the improvements for T2 would provide a better traffic solution in the town which will aid regeneration. Although the regeneration programmes were not committed development at this stage the traffic associated with an assumed regeneration scheme was included in the Transport Assessment to ensure that the way Terminal 2 was developed supported the regeneration of Dover.
- Air Quality/Noise: A Traffic/Air Quality/Noise/Vibration Topic Group was set up to take account the views of the regulators.
- Natural Environment: The affect T2 would have on local designated areas was modelled. Surveys of the wildlife in and around the harbour were subsequently conducted, including birds and marine life to ensure that the correct level of protection provision is achieved throughout the construction and operation of the terminal.

2.4.1 Ongoing consultation

In reaching out to both commercial and community audiences, the Port hosted a number of local workshops, attended business events, and canvassed opinion to help shape the direction of the DWDR proposals.

- A two-week DWDR promotion period, based on the promenade waterfront: allowing the public to look at a wide selection of imagery outlining the updated plans, design principles and a series of 3D images of the project. The promotion period also included a new and updated 3D animation of the proposed development. The promotion period is also intended to highlight the consultation process throughout the Harbour Revision Order (HRO) and the inward investment opportunities for wider Dover regeneration. Staff of the Port and Community Forum (PCF), Port User Group (PUG) and Dover District Council (DDC) were invited to the launch of the special two-week period to give feedback and have questions answered regarding the project.
- Deliver for Dover: a campaign to restore pride in Dover for the DWDR project, including generating cross-sector support; linking job creation and key attractions celebrating heritage to help deliver Dover's regeneration plans.
- Two public consultation meetings: where information was provided about the DWDR development that have happened to-date, including the A20 Junction Improvement Scheme and related Enabling Works, and the Goodwin Sands Marine Licence Application.
- DWDR workshops and related events: four DWDR workshops (customer and community), two Annual Consultative Meetings, two Port of Dover Community Regatta's and related business events including a Kent construction expo and three UK property trade shows with DDC.
- DWDR Marketing Suite (open every Wednesday afternoon and during the Port of Dover Community Regatta): where information can be provided about the development project and answer detailed questions about the design.

- An online feedback form: asking respondents to rate key aspects of the development, as well as providing them with the opportunity to provide feedback in free text format.
- Stakeholder consultative forums: The Port's two primary and independently chaired consultative forums, the Port and Community Forum (PCF) and Port Users Group (PUG) meet every quarter and bi-yearly respectively to debate and progress a range of important issues, including the DWDR project and regeneration aspects it will bring to the town.
- Continual engagement with local businesses, residents and stakeholder groups throughout the A20 construction period to advise of change to the road environment and reinforce the political background to the road improvement along with the long-term economic benefits to town and its role in supporting the waterfront regeneration and Dover District Council's St James leisure and retail development. A dedicated Community Liaison Officer was appointed to support this process.
- Detailed stakeholder engagement with every construction process: throughout the DWDR construction process, including the enabling works and civil marine works, a process has been implemented since early stages of the project to inform all relevant stakeholders and the general public of every detailed change to the development. This also includes engaging with the following:

Consultation event	Attendance/participation
DWDR promotion (physical and online)	3,493
DWDR promotion survey	52
Deliver for Dover	11,500
Public consultation meetings	32
Workshops	170

2.4.2 Active engagement with local authorities

Consultation with Dover District Council (DDC) has been very active throughout the planning process for the DWDR project. This has included:

- Regular general meetings to shape the application and the consultation
- Monthly planning meetings with consultants and DDC officers
- Regular briefings to senior politicians and executives
- Frequent meetings to resolve conditions and developer contributions
- Heritage Working Group
- Environmental Working Group

Regular engagement with the local MP through a variety of channels to ensure his team are briefed on progress.

2.5 Options considered

The junction improvements are to support Dover town centre and waterfront development. They are also an adjunct to the wider delivery of cargo facilities, protecting long term port capacity and enabling transformation of the waterfront. A number of options have been considered including the following.

2.5.1 Do nothing

As housing development and town centre regeneration moves forward, car journeys will increase. It will not be supported though by adequate road capacity that is also be required to handle most of the forecast 40% growth in the Port's freight traffic by 2030 as the A20 remains the primary route to the Port. Furthermore, without the junction improvement works the Port of Dover would not be able to commence DWDR project. As a result of that the cargo business is likely to leave over time due to the lack of space in the current cargo terminal. As ships get bigger and the business moves more to container-based operations, Dover will not have the facilities to handle the traffic.

Therefore this case assumes that a "do nothing" future would still include DTIZ/St James' and LDF in Dover and the consequential impacts of these on traffic flows.

2.5.2 Do something

Deliver A20 junction improvements, changing Prince of Wales and York Street roundabouts to signalised junctions. This will enable regeneration and the start of the DWDR project (including jobs and housing) as described above.

2.5.3 Do maximum

Deliver A20 junction improvements and deliver subsequent Union Street widening and access to/from seafront around new marina and waterfront regeneration sites. It is intended that these additional works will be delivered at a later stage in the programme of works. This will enable regeneration and the start of the DWDR project (including jobs and housing) as described above.

2.5.4 Selected option – staged approach to do maximum

Delivering the A20 improvements (do something) will support the delivery of Dover District Council's LDF Core Strategy regarding major housing as well as DTIZ through improved transport links to accommodate resultant traffic growth. The A20 junction works will also accommodate the residual increase in port traffic generated by DWDR. In particular, the York Street and Union Street arms are given a better opportunity for traffic to turn, enter and exit from the trunk road.

The existing Dover Cargo Terminal (DCT) business situated in the Eastern Docks has been successfully operating and developing for a number of years. However, there is no opportunity for that business to grow in its current location and without new facilities it will soon lose the ability to meet its customers' increasing needs. The current DCT cannot handle larger vessels (marine limitation) or accommodate the load that they carry (space limitations). Developing cargo facilities within the Western Docks is a fantastic business opportunity that will expand this business, utilise the HRO for the development of the Western Docks and unlock other commercial opportunities for the town and the community.

Combined with the regeneration plans within DWDR, the Port's intention over time will be to "do maximum" through the defined stages of the DWDR programme.

3 Economic Case

3.1 Overview

The economic case provides evidence of how the scheme is expected to perform, in relation to its stated objectives, identified problems and targeted outcomes. Ultimately it determines if the scheme is a viable investment, whose strengths outweigh its weaknesses and which provides good value for money.

3.2 Socio-economic benefit of the Port of Dover to the United Kingdom

A recent report by independent economic consultancy Oxera in 2014 found the combination of Dover's location and the efficiency of its operations resulted in a net benefit to its customers of some €3 billion.

"Following a robust economic analysis, it is plain to see the Port of Dover is a vital cog in the UK economy and European logistics chain."

(Andrew Meaney, Managing Consultant of Oxera)

3.3 Regional socio-economic impact of DWDR

The project supports the four key priorities identified in the SELEP Strategic Economic Plan (productivity, skills, housing and growth corridors) by accelerating economic growth by taking advantage of an immediate business/market opportunity in the cargo sector that in turns supports wider waterfront regeneration. It delivers new strategic infrastructure as part of the Port's role as a key UK gateway whilst delivering new property opportunities that increase Dover's appeal.

The Port of Dover would not be the only organisation that would benefit from the DWDR project. The Port itself would generate employment and revenues, these direct effects capture the immediate effects caused by changes in demand. However, its downstream supply chain would also benefit, these intermediate effects are the subsequent effects caused by the consequent changes in intermediate demand. Finally, the ensuing change in the compensation of (more) employees causes further spending in the local economy and hence further increases in final demand.

DWDR ensures the safeguarding of 148 jobs, as well as creating up to 600 new direct jobs and 719 indirect and induced jobs. Jobs created will be in the commercial port activities and latterly in retail and leisure. In total this will enable the creation of 1,685 jobs through waterfront development and town centre regeneration (DTIZ) together with DWDR. It is therefore a game changer in terms of economic prosperity and opportunity for Dover. The project is also the catalyst for delivery of quality housing associated with waterfront development in support of the wider Core Strategy as part of the Dover District LDF.

Using job creation, along with the average GVA per worker (as published by the Office for National Statistics – www.ons.gov.uk), it is possible to estimate the additional GVA generated by DWDR. This gives an estimated additional GVA of £28.1m per annum or £603.6m NPV over the project period.

DWDR protects a viable and more prosperous cargo business for Dover by meeting increasing demand. The retained jobs and increased employment (600 new jobs) generates increasing economic activity in the Dover area and the wider South East economy.

A further benefit to the wider supply chain is the reduction in vessel miles as a result of the project. Currently vessels serving Dover go on to make a further call at either Antwerp or Rotterdam (to service the mainland Europe market). The Port of Dover logistically offers the minimum diversion from the shipping lanes for these vessels. The effect of these fuel savings by vessels visiting Dover is estimated to be approximately £2,000 - £7,000 per call. Whilst these are modest savings at a per call level, they add up to a £32.2m saving in NPV terms from the cost base of the shipping industry and adds to the rationale to increasing the Port's cargo capacity.

As well as the permanent benefits derived, there will also be benefits during the construction phase. Based on a project of this scale and the socio-economic impact assessment previously commissioned for Terminal 2 (Arup, January 2007), it is estimated that the construction phase will create 212 FTE jobs.

Furthermore, the Port is in a new partnership with a local education provider in order to establish courses that will give local young people the right skills in order to have the best chance of securing future employment through the jobs being created by DWDR. This therefore creates a local and sustainable workforce into the future.

The transport aspect of this scheme will help improve free flow traffic along the A20 in Dover providing journey time and congestion reductions, air quality improvements and significantly improving accessibility between the town centre and Dover Waterfront. In these respects, we would expect this scheme to delivery high value for money. The junction improvements will facilitate traffic to and from DTIZ development (comprising 120,000 sq. ft. of retail and leisure, 450 parking spaces, and will feature a 16,000 sq. ft. M&S store, a six screen multiplex Cineworld cinema, a 120-bed hotel, five national chain restaurants and 12 retail units) promoted by Dover District Council.

The project was launched publicly in February 2014 at the Port and Community Forum. The feedback to date has been very positive. The engagement with the community, customers and other stakeholders has given them the opportunity to provide input and comments regarding the proposed development. Most of the comments have been very supportive:

- The community wants the Port to get on with the works
- They were supportive of logical solutions
- Most see the project as the only chance for Dover to kick start regeneration and attract new business and jobs

The DWDR project brings a lot of confidence to the local area and optimism about the future regeneration opportunities and job creation. It is worth noting that the HRO was ratified by the Secretary of State without the requirement for a Public Inquiry.

A socio-economic appraisal of the project has been carried out, evaluating the GVA (gross value added) from each job created by DWDR and its associated revenues. This results in a benefits to cost ratio of 2 as per the next table.

£m NPV (real, 2014)	Low	High	
Cost to DHB	(152.0)	(152.0)	
Direct operating costs	(51.5)	(51.5)	
Crown estate, insurance and rates costs	(14.6)	(14.6)	
Avoided maintenance expenditure	46.8	46.8	
Net total project cost	(171.2)	(171.2)	a
Revenue to DHB	173.6	200.0	
Total impact on GVA	143.3	684.0	
Port user benefits due to value of fuel savings	32.2	32.2	
Net total project benefits	349.2	916.2	b
Benefit to cost ratio	2.0	5.4	b / a

Source: Port of Dover/Oxera

The benefit cost ratio was produced in collaboration with Oxera, the economic consulting firm. They carried out an independent assessment of the project, based upon Dover Harbour Board's proposed business model and carrying out a detailed and rigorous assessment of the relevant counterfactual which is the closure of the existing Dover Cargo Terminal from 2017, which would cause the immediate loss of 148 local jobs. The investment appraisal looked at two types of benefits, direct and indirect effects. Dover Harbour Board has subsequently updated Oxera's analysis using the core Oxera methodology.

The direct effects of the Dover Western Docks Revival will be the immediate consequences of the change in activities at the Port. Effectively, this is the value of the resources at the Port used to supply extra services to its customers. The indirect effects refer to the contribution of the supply chain that provides inputs to the Port; when added to the direct effects, this amounts to the overall value of the extra services that the Port provides — the contribution to the economic footprint of the Port.

Socio-economic benefits extend beyond job creation. DWDR will both be contributing to a reduction in noise and air pollution; this will have a positive effect on living conditions and health. Safety will also be improved with the development of port infrastructure, the reduction of congestion levels and related road traffic accidents.

3.4 Further opportunities

Alongside the immediate opportunities for the ferry operation in creating for more space for freight vehicles within the Eastern Docks, there is also a longer term opportunity to make their journeys more efficient. Around one third of those vehicles leaving the UK via Dover do so empty. By developing port-centric distribution at the Western Docks, it will be possible to create added value activities that mean freight vehicles can collect a load on route to the ferry terminal through which they would have been passing anyway. Such added value

activity will create further jobs and improve the efficiency of the supply chain by reducing emissions and lorry miles.

Alongside the development of a port centric distribution centre, the Port is also looking to transform the waterfront by pursuing the opportunity to attract a host of shops, cafes, bars and restaurants in order to create a really vibrant and iconic waterfront destination for Dover based around the new marina curve that will be built as part of the infrastructure housing the new marina in the harbour.

The Port has created a new regeneration division, Dover Waterfront Limited, which will ensure a strong and dedicated focus on waterfront development whilst the Port continues to deliver the commercial aims of the DWDR vision alongside the existing busy ferry, cruise, cargo and marina operations. The new company will work with partners to realise the regeneration opportunities arising from the expansion of the Western Docks.

As such, a Memorandum of Understanding has been signed with a leading real estate partner, Bride Hall, to take forward the key waterfront development opportunities. Bride Hall is bringing its expertise to develop a viable scheme that is complementary to other exciting projects in the area such as St James' development in the town centre.

"This is an exciting announcement for Dover and we will be working together with the Port's new waterfront regeneration arm and Bride Hall to ensure that all of our plans for the regeneration of Dover are coherent, joined up and offer the best opportunity to make a once in several generations difference to our community and Dover as a thriving destination."
(Nadeem Aziz, Chief Executive, Dover District Council)

3.5 Financial feasibility

DWDR brings a multi-faceted set of benefits to both the port and the wider community. To analyse the full impact of the project, it is necessary to look at both sets of benefits separately and then combine these effects in an overall benefit cost ratio.

The commercial appraisal of DWDR results in a positive but marginal net present value (NPV) of £153 million (or a nominal IRR of 4.59%) based over a 60-year period.

4 Commercial Case

4.1 Overview

The commercial case provides evidence that the investment can be procured, implemented and operated in a viable and sustainable way.

4.2 Procurement process

The Port entered into a legal agreement with Dover District Council (DDC) and the Highways Agency (HA) to carry out enabling works on the A20 in advance of the opening of DWDR. The specifications were then submitted to HA after consultation with DDC.

Hyder was appointed, with its partner Schofield Lothian, a cost consultant, to carry out the detailed design, invite tenders and recommend a main contractor. In addition, Transport Planning and Highway Solutions provided transport consultancy services in support of obtaining the legal agreements from the Highways Agency and Kent Highways (KH) to work on their road networks.

The works will improve through flows of traffic along the A20 Snargate Street and Townwall Street by creating light controlled junctions with new signal control technology. On completion the junction improvements will be handed over to the HA and KH to run and maintain as part of their networks.

As the vast majority of the work is on land owned by the HA a Section 278 agreement was signed prior to any construction work on the A20 trunk road.

4.2.1 Tender invitation and evaluation

Invitations to tender were issued to six civil engineering contractors following a pre-selection process. Five of the contractors submitted a tender return as one withdrew from the tender process on receipt of the documentation, citing a heavy workload, despite going through the pre-selection process.

From the tender returns, two were informed that their tenders were unlikely to be given further consideration whilst the remaining three were asked to attend a round of contractor interviews.

Following the interviews, a list of points of clarification was sent to each of the contractors. The returns from the clarifications, along with the normalisation of the potential risks and anomalies, gave a comparison table of final costs for the contractor's tenders.

The scoring matrix utilised for tender evaluation is based on a price and quality split (70/30 respectively). The scoring for quality was broken down into a small number of sections with the maximum number of points available in each category, as follows:

- Programme and completion date (10 points)
- Health and safety policies and awareness (5 points)
- Environmental policies and awareness (5 points)

- Quality submission (10 points)

4.3 Key contractual arrangements

Jackson Civil Engineering's tender was the most detailed submission and addressed the key risks associated with such a high profile roadworks scheme. The assessment provided by Hyder supported management's view that this was the most advantageous tender as specified within the OJEU notice.

Works are due to be completed in early December 2016 (Prince of Wales) and mid-January 2017 (York Street) with the overall contract completion date in early February 2017. The contract also includes a delay damages clause against this date based on each day after agreed contract completion date.

Post-completion the Port will arrange for a Road Safety Audit to be carried out and Highways England will undertake a final completion survey.

4.4 State aid

The Port has sought legal advice from DWF LLP on this issue and such advice concludes that the works are not State Aid. Their advice was that the Highways Works project should be capable of proceeding on a "no aid" basis as general public realm infrastructure lacking selective benefit.

This rests fundamentally on the facts showing that the funding will be spent on general public roads that are open to the public on a free and non-discriminatory basis, will be used for general purposes, and therefore are not specifically for the benefit of the commercial operations of the Port.

Further, traffic studies have shown that the requirement for the works are driven by growth in local traffic through the Dover District Council development plans and not through the DWDR project.

Referred to as option 3, this is evidenced within the Dover Transport Strategy from 2007 which predicted trip growth increases of around 35% (am) and 75% (pm) using the DfT's TEMPRO guidelines for 10,000 new dwellings. The full report can be found via the following link:

http://www.dover.gov.uk/Planning/Planning-Policy/Local-Plan/Evidence-Base/Studies/TRANSDoverTransportStrategy.pdf

The quantum of transport journeys by 2026 is shown within the Air Quality Assessment of the Dover Transport Study from June 2008 – again relating to option 3. Whilst the split of roads is different to the HRO Environmental Statement (section 1.3), there is congruence with the Average Annual Daily Traffic totals without T2.

http://www.dover.gov.uk/Planning/Planning-Policy/Local-Plan/Evidence-Base/Studies/TRANSAirQualityReport.pdf

Having established that State Aid does not apply to the A20 works, the State Aid rules with regard to additionality do not apply automatically. As part of this business case though, the Port would commit to providing it voluntarily through the marina pier from stage 2 of the DWDR development.

The full version of the legal advice provided is in Appendix A.

In addition, the marina pier and access to the seafront will also be open to the public without charge.

5 Financial Case

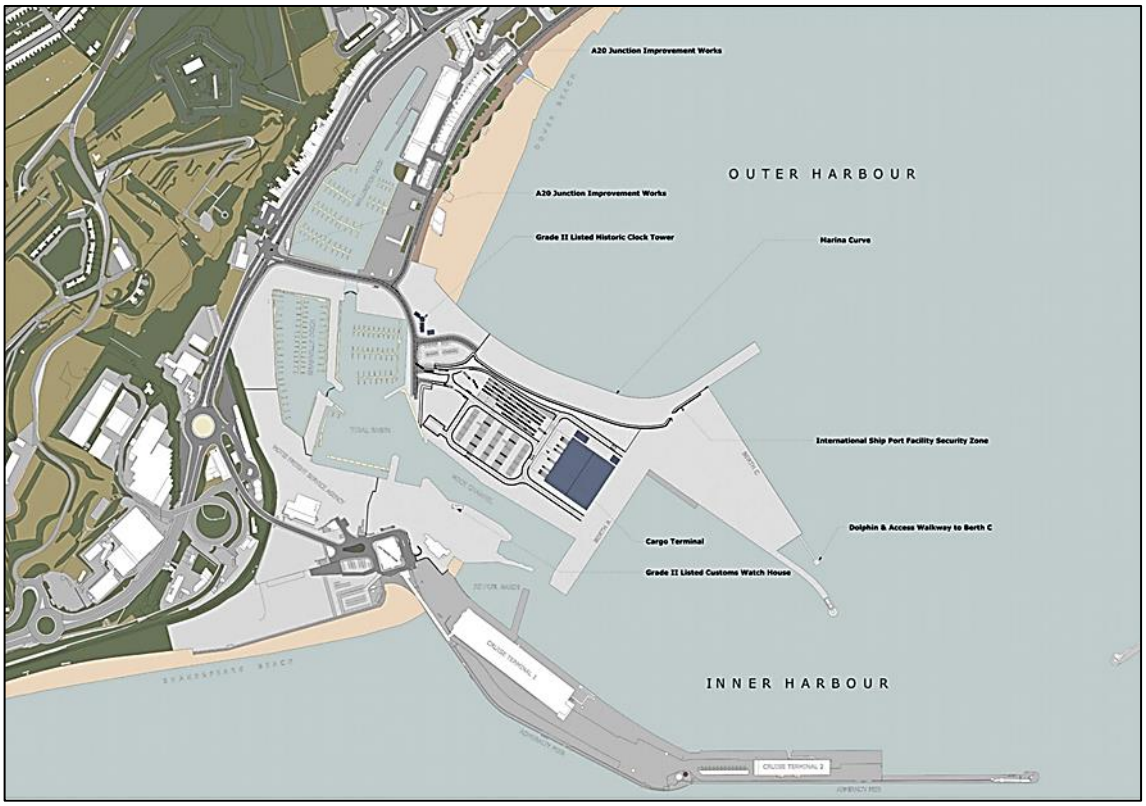
5.1 Overview

The financial case gives a breakdown of the expected project cost components.

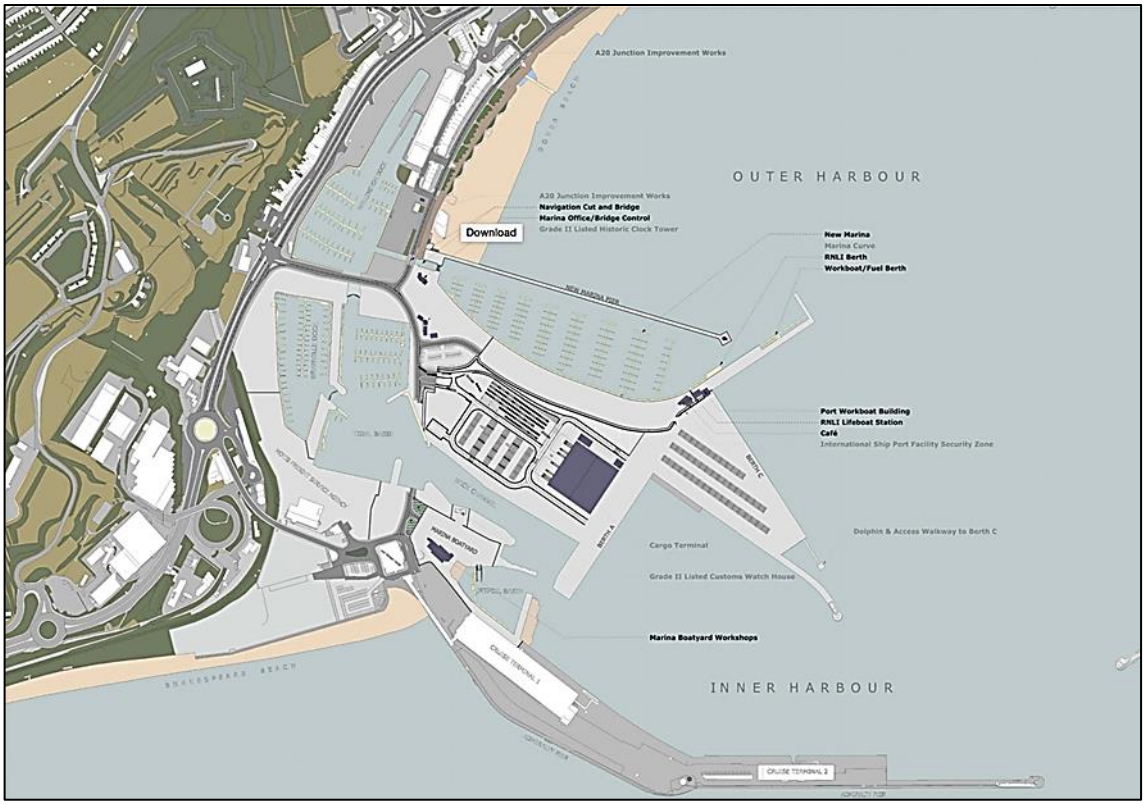
5.2 Costs and phases

The DWDR project is still going through detailed design and procurement but total costs for the scheme will be around £254 million and the project will be delivered in 3 stages:

Stage 1: A20 roadworks
Construction of 2 new cargo berths
Construction of the new "marina curve"
Construction on new refrigerated cargo terminal
Demolition of old Dover Cargo Terminal and construction of new ferry assembly space



Stage 2: Construction of new marina pier
Extension of new marina curve
New navigable channel from marina through to Wellington Dock
New bascule bridge



Stage 3: Closure of sea channel to old marina
Closure of Wellington Dock through to old marina basins
Fit-out of new marina
Reclamation of land

[redacted]

[redacted]

The wider project will not end there. Later stages will then involve construction of warehousing for port centric logistics operations, buildings for retail and leisure on the marina curve and around the Wellington Dock and residential development around the seafront.

The cost for these further developments will be incremental to the DWDR project and will be delivered through partnerships with others but may well proceed faster with seed capital provided by the Port.

5.2.1 Stage 1

The Port has already committed to the delivery of the first phase of DWDR, which is its biggest ever single investment.

The above Eastern and Western Docks projects all form part of the BRIDGE (Building the Resilience of International and Dependent Gateways in Europe) partnership between the ports of Dover and Calais. This is an on-going commitment to deliver complementary infrastructure and capacity to meet the demands of future traffic growth and to garner European support in order to attract EU funding.

Both ports have been successful in securing European funding with (on the UK side) the support of the Department for Transport. The DWDR project has received €43.5 million in recognition of its importance to enhancing the resilience of UK-European trade flows.

In June 2014, the Port applied for new powers in order to support delivery of DWDR. Historically, the Port was only able to generate funds towards its developments through its tariffs. However, the development of the Western Docks was of such a scale that this would not provide a way of delivering DWDR within the timescale needed. Therefore, the Port applied for new borrowing powers in order to be able to borrow from the banks and financial institutions and secure against assets. In October 2014, the Port was granted its additional powers and so has been seeking additional funding through the financial markets.

5.2.2 A20 roadworks (within stage 1)

Within stage 1 of DWDR, £5.1 million relates to A20 junction improvement works required by the Highways Agency and Dover District Council as part of the consent to develop the Western docks. The new enhancements will deliver the additional capacity for increased numbers of vehicles from Dover District Council's DTIZ development and the new housing identified in the LDF. It will also accommodate the regeneration and housing development aspirations within the DWDR project.

Forecasted expenditure on the A20 enabling works is currently £5.1 million with completion in February 2017. The breakdown is in the table below:

	Approved Budget	Committed Spend	Remaining Budget	Forecast Spend	Forecast Final Spend
Design and Site Investigation	460,855	460,855	-	-	460,855
Capitalised Development Labour	30,000	3,322	26,678	-	3,322
Main Contract	3,092,059	3,092,059	-	194,000	3,286,059
Section 278 Agreement, Legal, Audit fees and Commuted sums	150,000	124,535	25,465	20,000	144,535
Utility Diversions	591,000	591,000	-	-	591,000
PMO	421,323	182,169	239,154	-	182,169
Stakeholder Management, Legal Services	30,192	-	30,192	-	-
Miscellaneous (Road Safety Audit, Bond)	30,000	-	30,000	30,000	30,000
Risks and opportunities	477,386	348,299	129,087	68,125	416,424
TOTAL	**5,282,815**	**4,802,239**	**480,576**	**312,125**	**5,114,364**

5.3 Additionality

Given that the Port has already agreed to deliver the A20 development under the HRO, the additional benefits come from the wider aspects within the DWDR project.

The 2012 Harbour Revision Order provides the planning permission from the Secretary of State for the works envisaged at that time to be undertaken. The HRO is a planning document and does not put any obligation on the Port to deliver the scheme fully or in part.

The Port is though legally bound to deliver the A20 works due to a legal side agreement with Dover District Council which was agreed in order for the council to withdraw its objection to the 2012 Harbour Revision Order.

This agreement led to the inclusion of the York Street junction to the HRO alongside Prince of Wales which would carry the additional traffic for T2 and subsequently for DWDR.

The Port has also committed to altering the traffic signals at Woolcomber Street – which is between York Street and the Eastern Docks to ensure consistency with the traffic flows from the two junctions covered by the HRO. This is expected to cost around £50,000.

By way of additionality the Board will commit to building the new marina pier, the key structure for the new marina, by a date no later than 30 June 2020 (this date will be reviewed for the final submission). The marina is part of stage 2 and will form a new focus for the seafront and provide the catalyst for regeneration in that area. It will provide over time the centre around which new residential and leisure development will take place and will attract new visitors to the town.

If relevant agreements are in place, it would be possible to start work on the marina pier in March 2017 with a view to completion in November 2018. These would fall well inside the "backstop" date identified above.

The new marina pier is estimated to cost £10 million within stage 2 of DWDR. The 3 stages of DWDR have been collectively designed, but can by individually implemented. The Port's board will consider the capability of starting stage 2 and conceivably – especially with the unknown of Brexit – may determine that the DWDR project ends after stage 1 with the new Cargo facility in place but without the new marina and pier. This agreement would guarantee that element of stage 2 bringing with it the opportunity for leisure businesses and the attraction for visitors.

The practical need for the pier is first to provide a breakwater to protect the entrance to the marina. Adding the publically-accessible promenade is supporting the plans to regenerate the seafront and deliver benefit to the local area. Sea wall costs would likely be between £5,000 and £10,000 per linear metre, which means that the 560 metre pier could have cost around £4 million (taking an average) had it been designed as just a breakwater.

It is reasonable to assume therefore that the public benefit of the pier is costing the Port £6 million within the whole DWDR investment.

5.3.1 Early delivery of the DWDR

Bringing forward the marina pier in line with the agreement outlines above will also allow the other elements of DWDR to be brought to completion earlier. This will result in the economic benefits to the seafront and town being realised sooner creating further additionality.

The current master plan for the marina curve and the seafront includes delivery of the following:

- 543 residential units
- 39 commercial units (restaurants, retail, leisure)
- 75-bedroom hotel
- 1,382 square metres of public walkways

This is a considerable increase to what currently exists, which is just 26 residential and 3 commercial units.

This planning incorporates some stretch targets which, if met, would deliver considerably more than the 600 new jobs expected from DWDR.

6 Management Case

6.1 Overview

The management case outlines how the project and its intended outcomes will be delivered successfully. It gives assurances that the project will be handled appropriately and effectively monitored.

A governance review of DWDR in was undertaken by Grant Thornton in September 2016. The audit concluded with:

"Overall, we found that the management principles and governance processes being applied to the delivery of the Dover Western Docks Revival (DWDR) Programme are fundamentally sound. The Programme management office (Poi) has implemented a number of improvements over the last few months (for example to progress reporting and document management) and remains well established and well controlled. The clear ethos of positive collaboration, common purpose, professionalism and respect that we observed in our last audit remains evident amongst the DWDR team members."

6.2 Programme management plan

The DWDR programme sets out to achieve the Board's vision over a phased timescale. The schedule of when projects and sections shall be delivered is driven according to the Port's business drivers and the critical path of dependant activities.

The programme has been structured into Projects, each with multiples sections to deliver these requirements which are:

- Enabling Works
- Main Works
- Port Operations Buildings
- Dover Regeneration

The projects are organised within the 3 stages of DWDR with the Port Operations Buildings currently at the technical design stage and Dover regeneration at early feasibility and concept.

A Programme plan and schedule has been developed in Microsoft Project to cover all stages of the project. The current schedule runs to over 700 individual lines. A summary extract is made for the monthly report indicating the Critical Path.

At over 700 lines the project is at the usable limit of the software and is currently being converted into a more sophisticated project management package (Primavera). This will also allow more details of the support workstreams to be integrated into the programme providing a better single source of programme control. The project has recruited an experienced full time project programmer to manage this.

The top level governance of the project is provided by the DWDR Steering Group and monthly report.

The A20 junction redevelopment is a key part of the enabling works for DWDR so falls within the management and governance structure of the DWDR programme.

6.2.1 DWDR Steering Group

This consists of the Project Sponsor, Chief Executive, Director of Finance, Director of Corporate Development, Head of Programme Controls, Senior Project Manager and the Support Workstreams Project Manager. The group meets fortnightly with formal papers and meetings are minuted.

The purpose of the Steering Group is to

- Give direction on project strategy
- Monitor and track project progress in particular key milestones and critical path(s)
- Consider and sign-off high-level project decisions and changes
- Review the monthly reports by exception paying particular attention to issues, risks and opportunities

Other governance meetings, roles, frequency and attendance are in the following table:

Title	Frequency	Purpose	Attendees	Records
Project Management meeting	Weekly	Review of ongoing project progress and issues. Actions tracked.	Head of Programme Controls, Senior Project Manager, Support Workstreams Project Manager, Project Managers	Formal minutes and actions.
Senior Level Team meeting	Weekly	Regular informal tactical meeting to discuss and resolve current issues and concerns.	Sponsor, Head of Programme Controls, Senior Project Manager	Informal records only
Design Review meeting	Fortnightly	Agree design work plans and actions.	Senior Project Manager, Project Managers, Designers	Formal minutes.
Project Communications meeting	Fortnightly	To review and agree Communications strategies. Consider and agree response to Stakeholder issues.	Communications Team, Sponsor, Senior Project Manager and the Support Workstreams Project Manager	Formal minutes.
Health, Safety & Environment meetings	Fortnightly	General review of project safety & environmental aspects	Senior Project Manager, General Manager Safety & Security, Head of Safety & Environment.	Formal minutes.
Contract progress meetings	As appropriate for each contract	Review progress of each contract. Review spend, forecast and budget. Consider Early Warning Notices and Compensation Events. Review Health and Safety. Consider Value Engineering opportunities.	Senior Project Manager, DWDR Project Manager, Contractor Project Manager	Formal minutes.
Heritage Steering Group	Every two months	To ensure that the Archaeological Written Scheme of Investigation is delivered. To review and consult on Listed Building Consent applications prior to submission.	Project Archaeologist (RoyalHaskoningDHV) Company Secretary Sponsor Dover District Council Kent County Council Historic England The Victorian Society	Formal minutes

6.2.2 The monthly report

In January 2016 the monthly reporting was enhanced with the Internal Audit report noting this as an area of good practice commenting that:

"There has been an improvement in the management information and reporting produced and communicated to the management team".

The monthly report provides details on all aspects of the project. It typically runs to about 40 pages of main content and includes 17 appendices drilling down into the detail of specific project controls. It includes a project dashboard as a single high level view of the project giving clear key performance indicators for senior management.

The main report includes an Executive Summary and narrative covering project progress; issues; risk; safety, health and environment, finance and commercial, design; procurement; and contractor reports.

The level of detail being tracked and recorded is indicated by the following appendices:

Appendix 1 – Project Dashboard
Appendix 2 - Observation Card Register
Appendix 3 – DWDR Combined Consents Tracker
Appendix 4 – Steering Group Tracker
Appendix 5 - Design Progress Log
Appendix 6 – Request For Information Register.
Appendix 7 – Project Procurement Schedule
Appendix 8 - PMO Organogramme
Appendix 9 – DWDR Risk & Opportunities Schedule
Appendix 10 – Change Control Log
Appendix 11 – Goodwin Sands Application
Appendix12 - CDM Principle Designers Report
Appendix 13 - DWDR Monthly Report Update Programme
Appendix 14 - Design and Access Statement Log
Appendix 15 - DWDR Programme showing critical path
Appendix 16 - DWDR Procurement Plan
Appendix 17 - Internal Change Control

6.3 Project workstreams

The project is sub-divided into workstreams. Delivery workstreams for individual construction items typically led by project managers within the main project team, and support workstreams led by senior managers within the rest of the business.

The A20 Works is an example of a mature delivery workstream having commenced in late 2015 and, as a workstream in implementation, has a further level of governance such as workstream progress meetings and a separate dashboard to ensure that the full objectives are met within time and budget (as reported above).

Consents and Licences is an example of a support workstream. The purpose is to ensure that all licences and consents required are in place in time so as not to adversely affect the delivery of the stages of DWDR. This workstream is led by the Company Secretary.

All workstreams have their own milestones and deliverables and are, or will be, incorporated into the overall, programme plan and schedule.

Traffic flows to and from the Port – as well as within the docks themselves – are closely monitored by the Strategic Analysis department. This is a function that will always be required by reviewing historic flows and forecasting future ones, therefore the Port can commit to providing annual information to the SELEP, or any other government body, regarding the impact of the new A20 junctions.

6.4 Risk assessment & management

The key objectives of the DWDR Programme risk management process are to:

- Identify those risks that are a genuine threat or opportunity for the DWDR Programme and therefore need to be managed within the risk process.
- Differentiate risks from challenges that are BAU (business as usual) problems for the Port / the DWDR Programme.
- Facilitate the grouping of risks according to impacts and causes to aid in the prioritisation of management resource and to enhance returns where commonality exists in causes.
- Rationalise risks to reduce the 'noise' commonly associated with busy risk registers that distract risk owners away from effectively managing the risks that really drive the DWDR Programme.
- Prioritise the actions required of senior management to those risks they are best placed to manage and influence the outcome of.
- Use risk data to generate reports that accurately communicate the DWDR Programme's risk exposure to the Port to inform programme decision making and add real value to project management.

October 2016's monthly report included the following summary on risks:

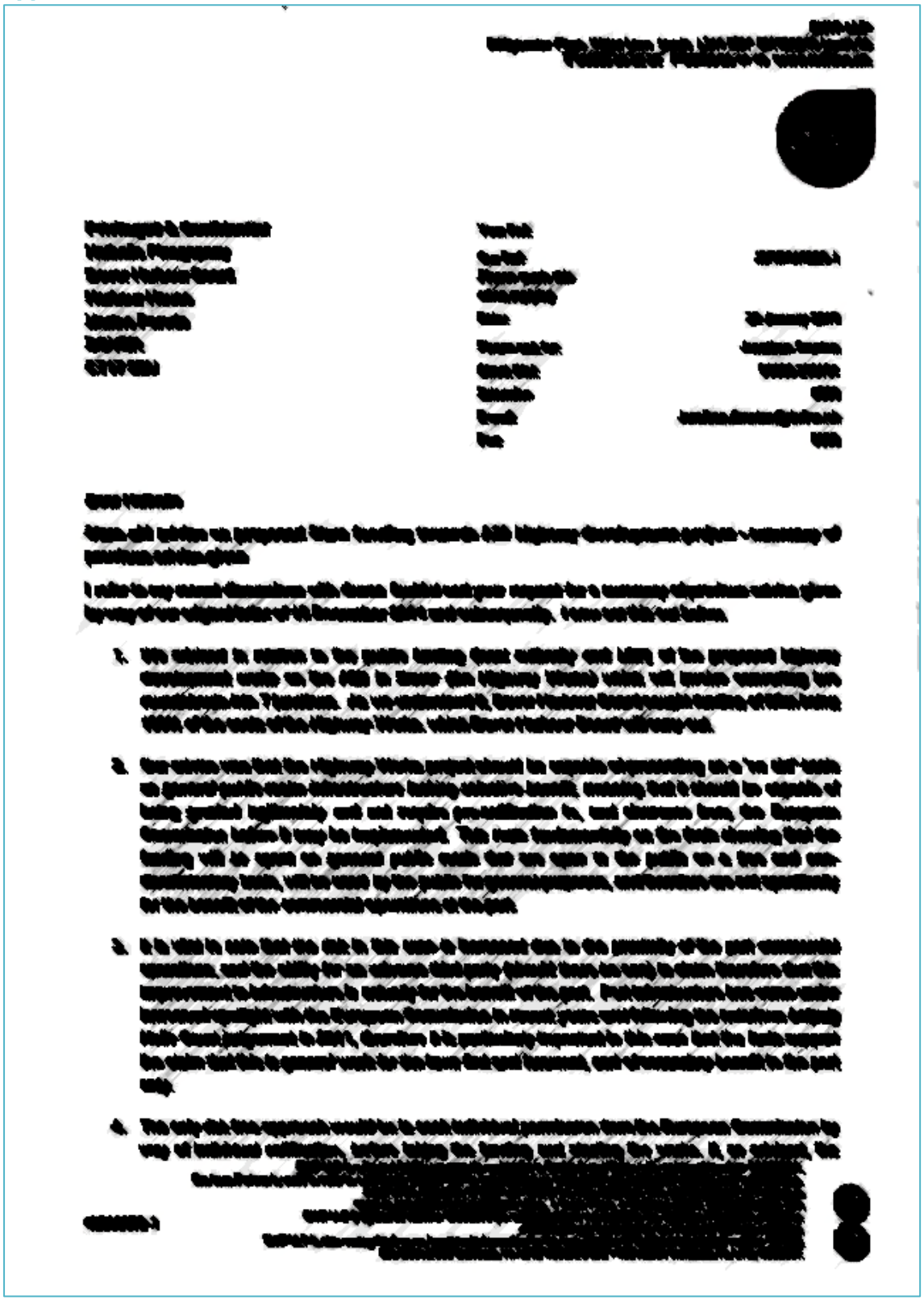
RISK REGISTER KEY PERFORMANCE INDICATORS

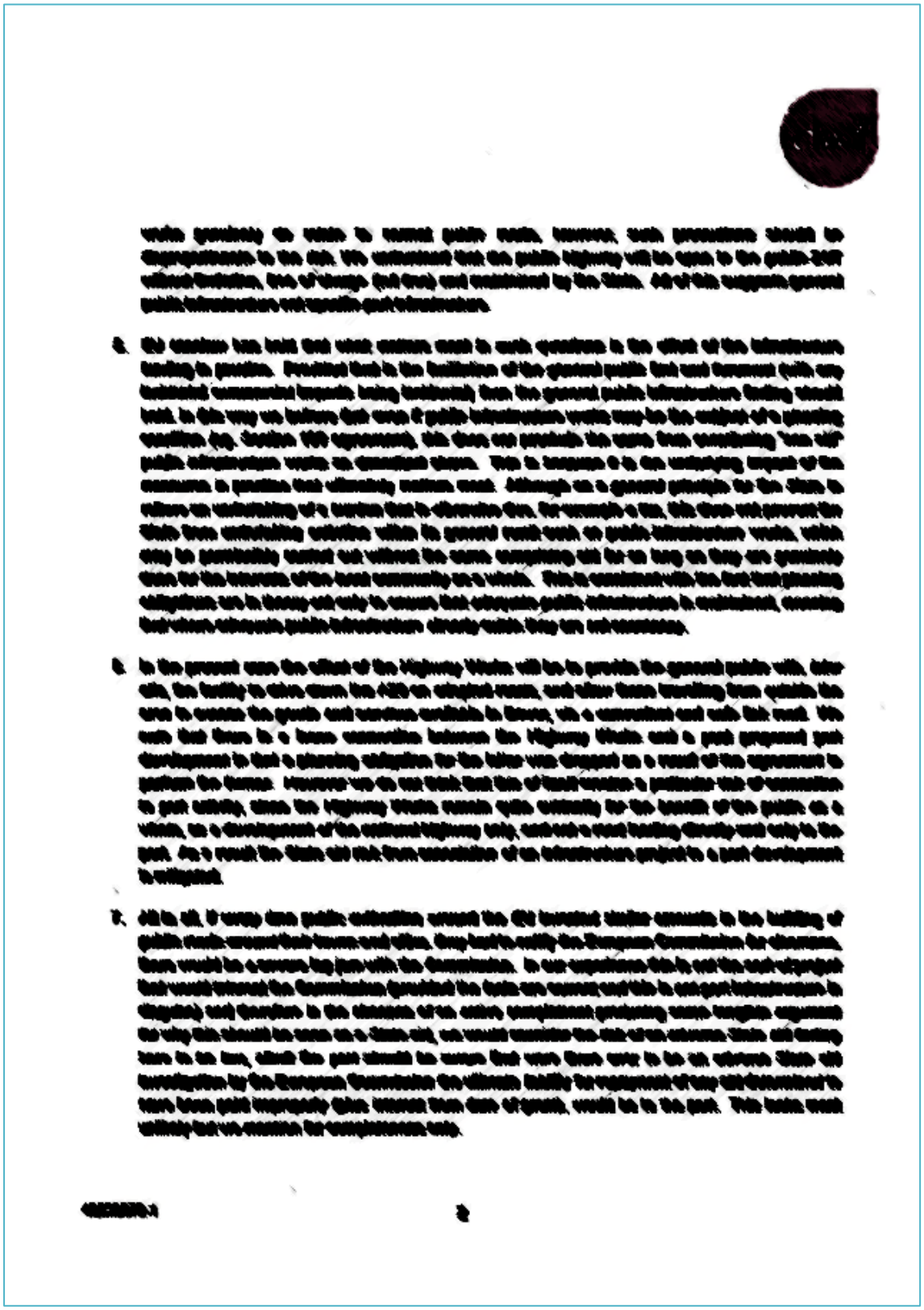
	This Review	Previously	Change
Total number of Risks and Opportunities considered to date	252	236	16
Of which the current number of Open or Active Risks and Opportunities are:	74	62	12
And the total number of Closed Risks and Opportunities are:	178	174	4

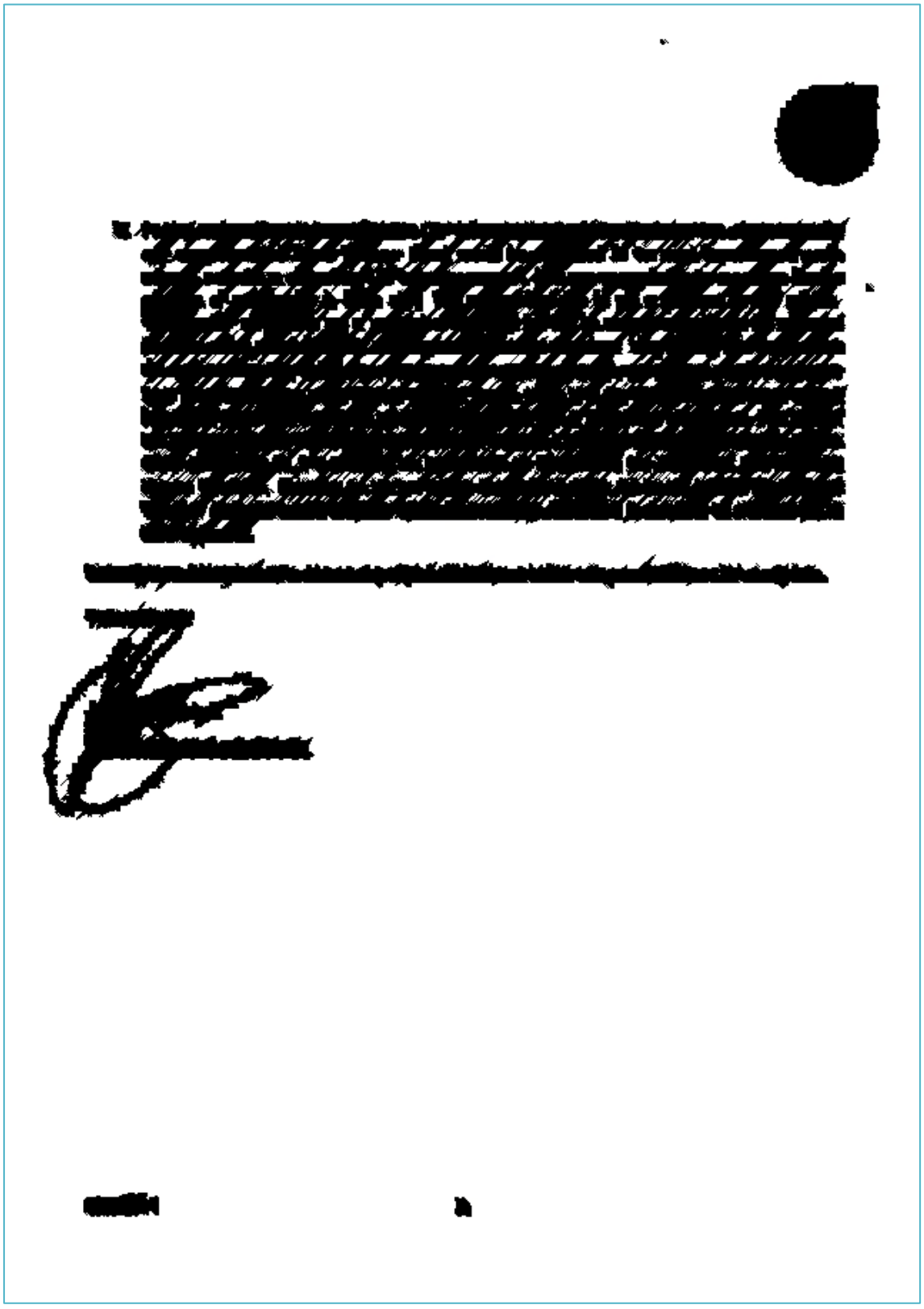
6.5 Stakeholder management & governance

The project has already received general political and community support locally via ongoing dialogue with key stakeholders and community interests in Dover (as outlined in the Strategic Case). The project management process will continue this level and depth of dialogue in order to maintain local support and to quickly identify any key issues that may emerge for the community during implementation.

Appendix A – Letter from DWF LLP re State Aid







Appendix B - Heritage

B.1 The Context

A number of studies that are part of the wide ranging Environmental Impact Assessment have fed into the design process to date and informed a necessary appreciation of the social, environmental, economic and historical context of the development. Although the context is to be most fully understood through this combined body of work, extracts of the non-technical summaries of two important studies are included below, namely:

- The Landscape and Visual Impact Assessment Baseline Report
- The Historic Environment Impact and Mitigation Report

B.2 Landscape and Visual impact baseline report (non-technical summary)

Dover's rich history has resulted from the town's unique strategic position as the principal entry point into England. This heritage is evident in many of the townscape areas, in particular in the historic core, the harbour, Castle Hill and Western Heights.

In places though, the heritage value of townscape areas has been degraded by unsympathetic development, notably along the A20 and in the St. James character area.

The town's development can, nevertheless, still be related to that of the port and its defensive setting. The operational harbour is a bustling place and an attraction in its own right, particularly when viewed from the cliffs and seafront.

The busy harbour sits alongside iconic monuments (Dover Castle) and iconic landscape (the White Cliffs) to form a unique composition.

The heritage interest associated with Dover and its harbour, however, is a much more intricate mosaic than these individual monuments initially signify. It is this richness of history, the fascinating juxtaposition of the docks, layers of history in the town, and landscape setting which creates much of the heritage value in Dover's townscape. Whilst many of the current townscape areas still reveal different periods of the town's history, recent pressures have had negative effects on the intactness of heritage values.

The town has an ambiguous interdependence with the port. The port is the economic driver of the town's growth and explains many of the 20th Century changes.

The success of the port has led to infrastructure improvements (the A20 and York Street bypass). These improvements, however, have weakened the relationship of the town with the port.

Insensitive development along these main roads have compounded severance effects, which include weak physical and perceived links. It is perhaps the degradation of this link between the town and the harbour that has had the greatest erosive effect on the heritage value of Dover's townscape areas.

To repair the important historic and socioeconomic links between the town and harbour, and thus much of the heritage value of Dover's townscapes, the DWDR project should be progressed sensitively with respect to the existing valued townscape and its heritage interest.

The DWDR project is just the latest chapter in the evolution of the town and its harbour, but should not focus on the Western Docks in isolation. Rather, the proposal needs to consider the role it can play in relation to the rest of the town and other current regeneration projects.

A sensitive response to the important relationship between the town and the harbour means thoughtful consideration of remaining historic spaces. Design work should also seek, where possible, to increase the visual and physical connectivity between the town and harbour.

The proposal should also explore ways of maintaining access to areas of heritage interest in the harbour, the piers and docks for instance and their interpretation. A thoughtful and holistic response to the proposal in the context of the town will help to ensure that the next stage in the evolution of the town and harbour will strengthen the heritage interest and value of this unique place.

B.3 Historic Environment Impact and Mitigation Baseline Report (non-technical summary)

The study forms the final phase of a broader historic environment assessment. It was developed in order to provide a historic environment baseline upon which the subsequent impact assessments and mitigation proposals can be determined as an additional stand-alone report.

The study provides a baseline history of the development of the town and port of Dover with particular reference to the proposed development area. The baseline study includes an outline of the geomorphological evolution of the Dour River and a detailed outline of the known and potential archaeological resource within the study project area. The wider heritage significance of key areas within the footprint and vicinity of the proposed development is also outlined and discussed. This discussion of heritage significance draws upon the townscape assessment undertaken as part of the baseline studies prepared to inform its conclusions and discussion of the heritage significance of the built environment of the study area.

The study area extends beyond the boundaries of the development footprint to enable a more comprehensive assessment of the historic environment.

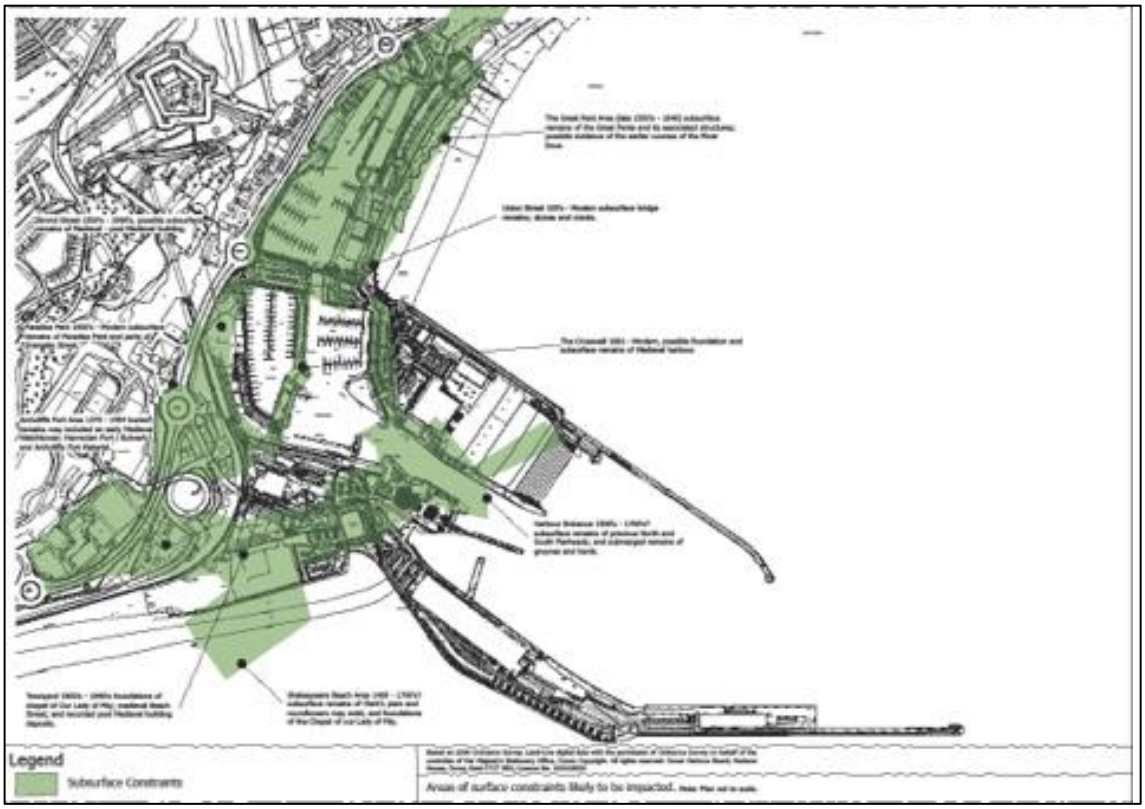
The following key aspects of this assessment are summarised here:

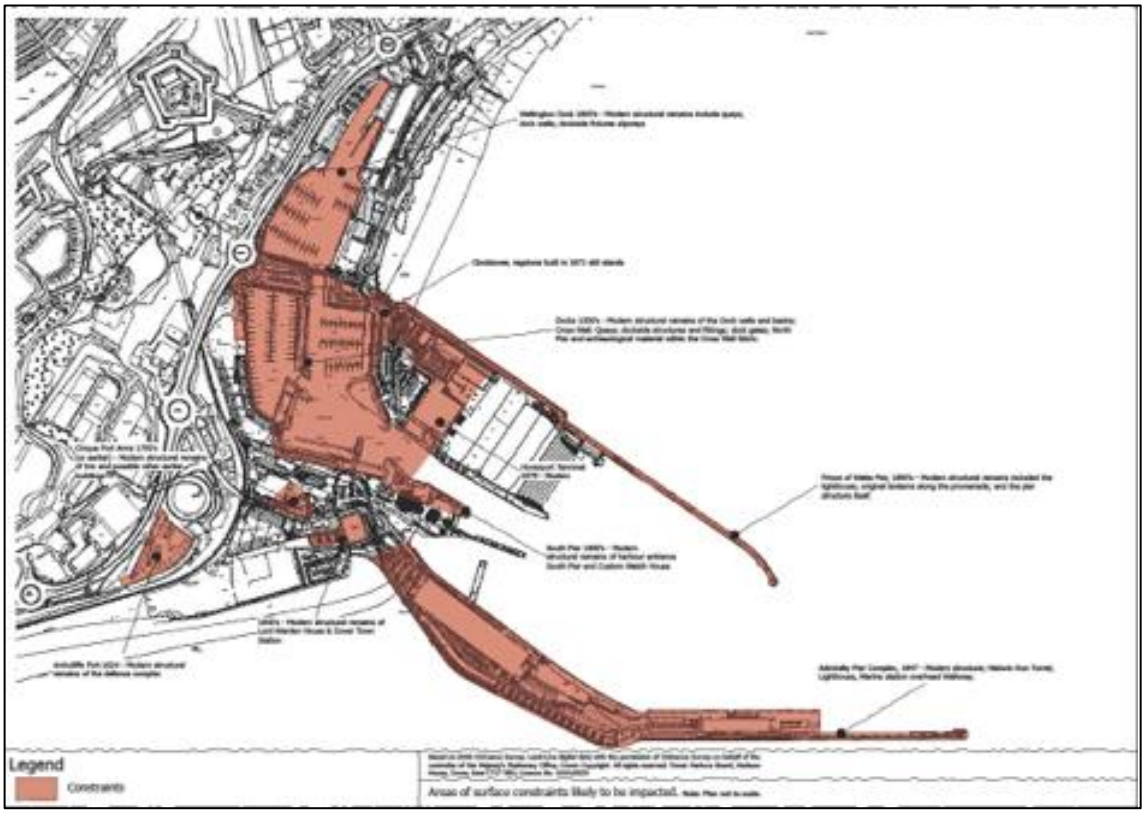
- Dover, as the front line of Britain, has an enhanced significance as an exit and entry point and strategically as a military or naval base.
- The Western Docks area is of great historic significance; the layout and extent of the docks has a clear continuity from the early development of a harbour to the west of previous town and harbour developments in the 16th Century.
- A number of significant historic buildings remain in the Development area and the area retains much historic significance in its present built character but their dispersed nature diminishes their collective ability to engender a sense of a historic environment. The historic assets that remain are the only visible expression of the rich cultural and industrial past.
- The historic environment within the development area is a product of the port development within the grander topographic environment of the Dour valley and

adjacent cliffs. The development of a port to the west of the town provided a basis for an extension of settlement into the western harbour area in the Post Medieval period.

- There is a substantial known archaeological resource within the development footprint from the prehistoric period onwards.
- There is a high potential for archaeological remains relating to the prehistoric and later environment and settlement of the development footprint areas, in particular for evidence relating to past sea level and the early nature of the River Dour.
- There is a high potential for archaeological remains of most periods within the development area. Notably there is a high potential for post medieval remains related to the growth of settlement around the creation of a harbour.
- There are potential archaeological remains relating to past maritime activity in the area from at least the Bronze Age.
- English Heritage produced a listing of buildings at the end of 2009 to which this project is taking note.

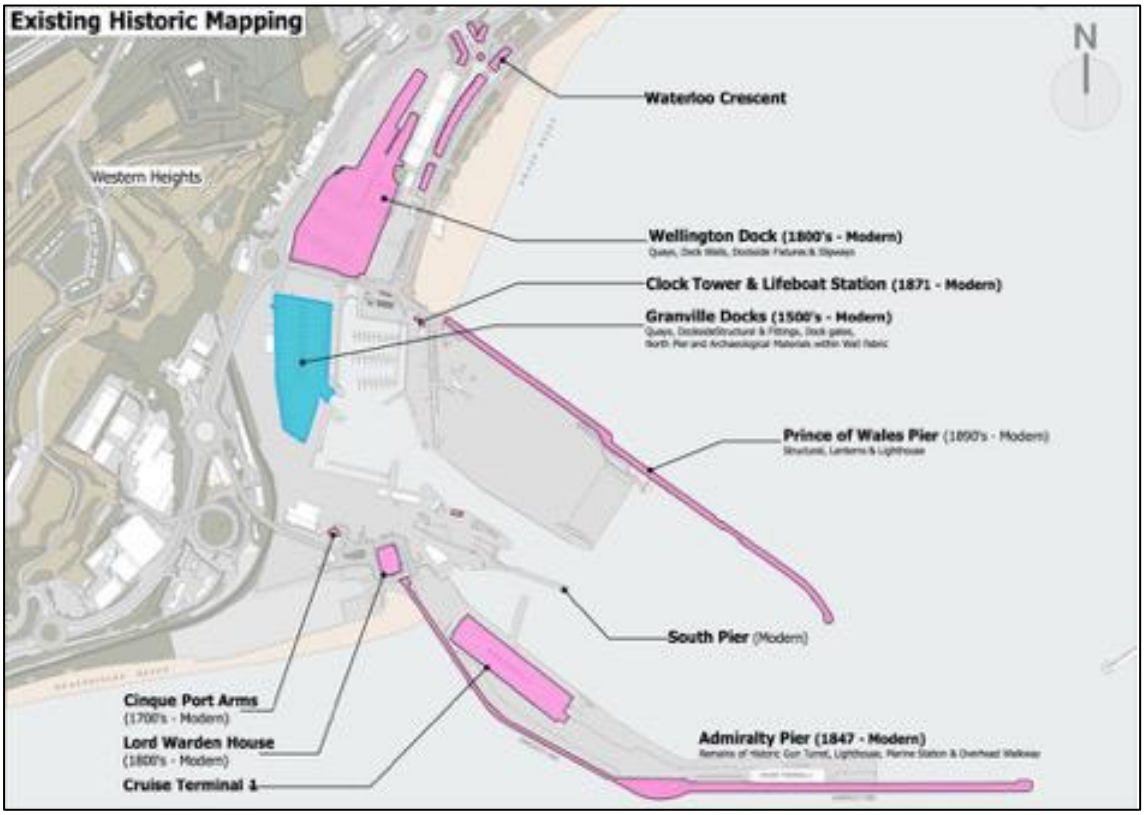
The project has identified and is working around constraints identified in the following diagrams:





B.4 Site Context Overview

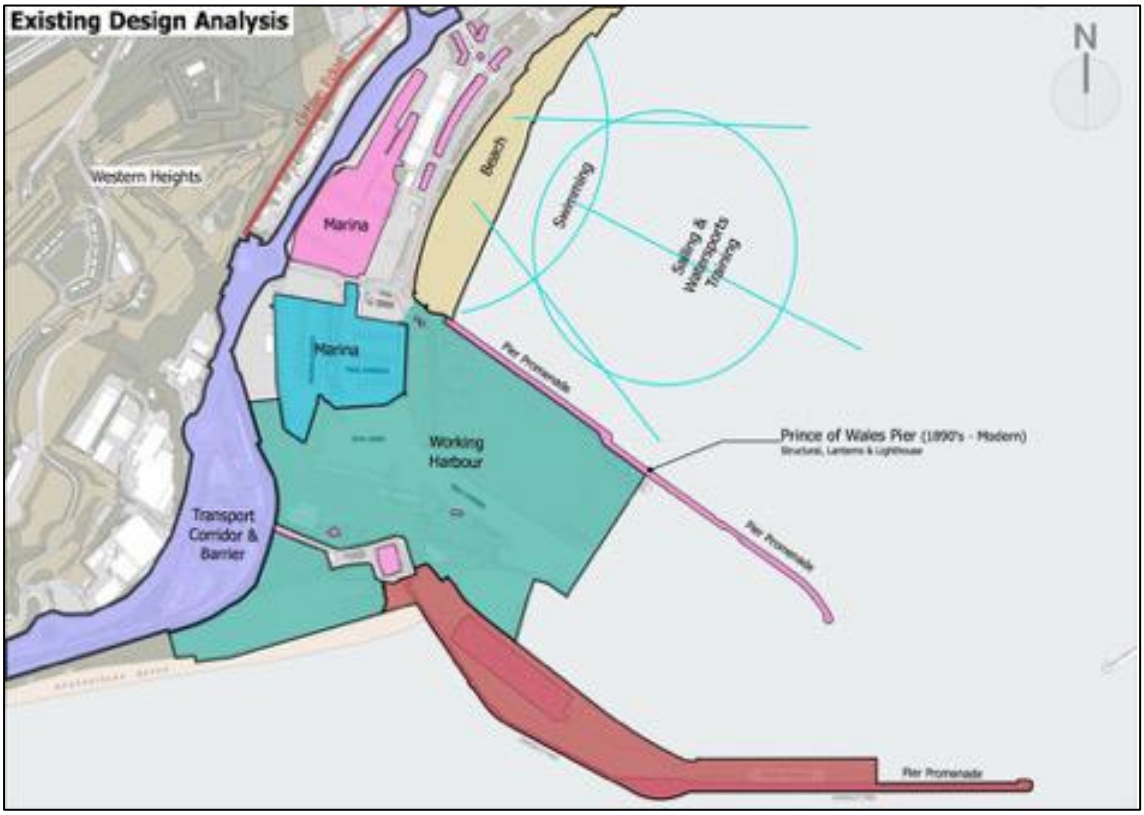
The diagram below provides a brief overview of the urban context of the redevelopment site of the Western Docks.



At present many parts of the Western Docks are publicly accessible. The Prince of Wales Pier contains a café and is a popular promenade and fishing spot. The Admiralty Pier can also be accessed for a small fee and is regularly used by fishermen. Along the Admiralty Pier, the Edwardian Marine Station presently contains the cruise terminal. Two lighthouses serve as markers at the end of both piers and help to contribute to the marine character of the harbour.

Within the docks Lord Warden House and the Cinque Port Arms are also accessible, although the A20 Viaduct and the railway line severance result in poor pedestrian connections. The Granville Docks and the Tidal Basin currently serve as an active marina.

In addition to the areas, the larger portion of the Western Docks is mainly characterised by lorry parking, car parking, freight and vehicular infrastructure which creates an impression of a noisy, bustling goods yard.



A transport corridor forms a hard edge to the western face of the site. Consisting of the heavily trafficked A20 and the railway line. It forms an impenetrable barrier to pedestrian movement on this side of the site. Beyond this infrastructure corridor, the slopes of the Western Heights create a strong sense of containment and a more attractive distant edge.

The southern portion of the site consists of an area that is poorly defined spatially and dominated by more freight and vehicle parking. The attractive stretch of Shakespeare beach lies beyond this part of the site.

To the north of the site the Wellington Dock and quays are used as a marina. A waterside shopping centre integrated into the surviving historic warehouses and a historic boat builder's yard now housing a Bistro form an attractive southern edge to the dock. A less attractive western edge is formed by the A20 transport corridor which serves to separate this area from its relationship with the rest of the town.

Also to the north of the site, Dover beach front runs along the length of the Esplanade and Waterloo Crescent. This area's distinctive character results from a combination of urban elements; the Georgian terrace and the Western Heights that form an attractive backdrop, the shingle beach and its activities and the distant views of the sea walls, Dover Castle and the White Cliffs.

The Landscape Visual Impact Assessment which forms part of the HRO undertook a detailed assessment of the surrounding character areas and views towards the development site. This work was subject to a rigorous consultation process and it strongly informed the emerging masterplan proposal by facilitating mitigation by design.

B.5 Heritage Items Overview

B.5.1 Heritage Items Steering Group

At the end of 2014 the Port met with KCC, DDC Conservation and English Heritage to discuss heritage matters and to agree the formation of a Heritage Steering Group (HSG). Consequently, this group has now been formed.

The HSG is a monitoring and review group, supporting delivery of the Archaeological Written Scheme of Investigation (WSI). A full level one recording of the Heritage Assets has now been completed and issued to the HSG. This Heritage Asset record has now been accepted by the HSG.

B.5.2 Archaeological Management

An Archaeological Written Scheme of Investigation (WSI) has been produced by the DWDR office. The HSG have approved the protocols in the WSI.

B.5.3 Storage of Heritage Items

The storage of heritage items ahead of reuse, where practicable, will be in two external fenced compounds at the landward end of Cruise Terminal 1 in a port secure area. Items requiring weather protection, in addition to security, will be located within a port secure area in the Cruise Terminal building itself adjacent to the overhead walkways.

B.5.4 Prince of Wales Pier (POWP) Closure and Lowering

In early 2016 the existing Prince of Wales Pier (POWP) was closed. The New Marina Pier and Marina Curve are planned for opening at the end of 2018.

The lowering of the first part of the former POWP pier is to be by about 2.5m. This is intended to provide safe and level access for all who are to use the new facilities from 2018 onwards.

The lowering is also to enable the safer delivery of future redevelopment of the port and assist the regenerative aim of the DWDR project.

In the proposed POWP lowering work, the utilitarian 1978 concrete upper structure and corroded sheet piling will be permanently removed but stone facings and copings of the original pier, affected by the lowering works, are to be set aside and re-used elsewhere in the new works.

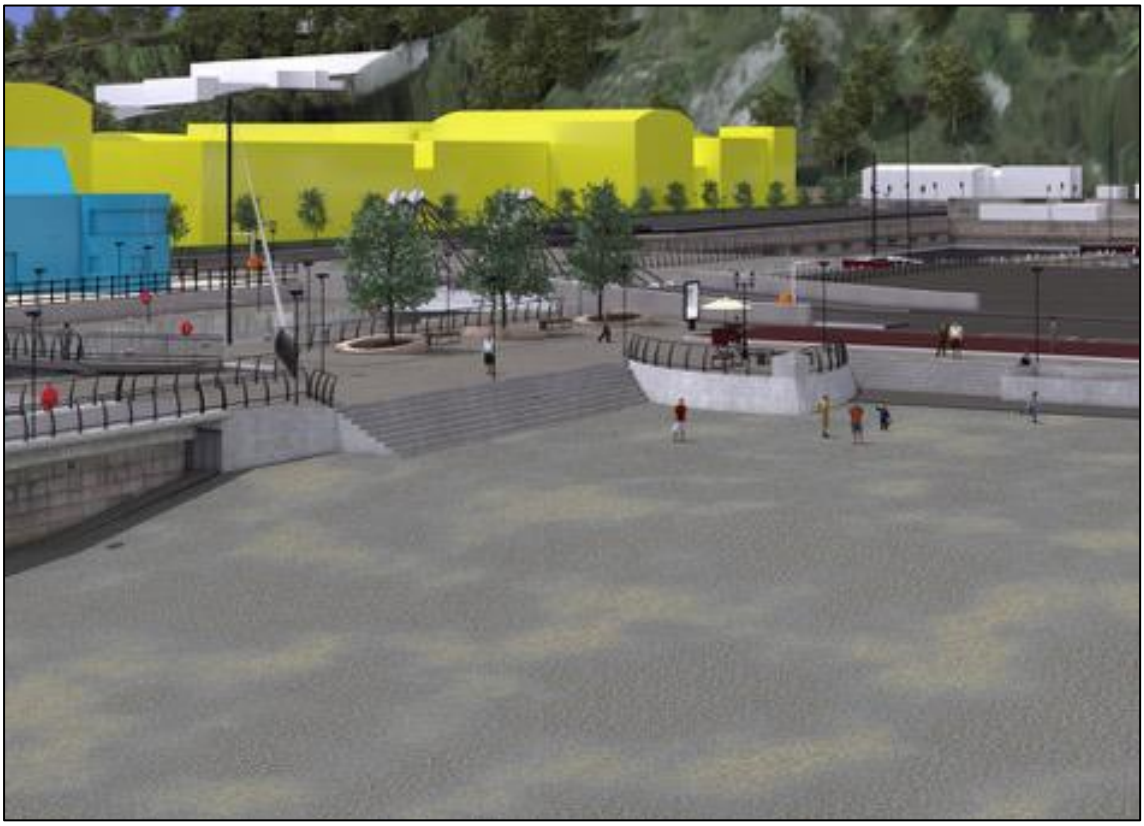
Examples of the possible re-use of stone, lamp standards and railings are shown in an illustrative view below.

B.5.5 Pier Approach

The access to the beach from the Charles II landing memorial, the ramped access to the start of the existing Prince of Wales pier and the walls next to the Clock Tower supporting the raised part of the pier are planned to be dismantled (see 5.5.4) and provide an aesthetically improved setting for the Clock Tower now retained in its current position rather than re-located as proposed in the 2009 Masterplan. This item 5.5.5, will be subject to a Listed Building Consent Application (LBC Application).

B.5.6 New Beach Access

With reference to 5.5.5 above, new Beach access is to be created at the landward end of the new Marina Pier. An illustrative view of this shown below.



B.5.7 Telford Sluices

These are adjacent to Granville Dock, and subject to review by the HSG. (See 5.5.1.)

B.5.8 LBC Applications

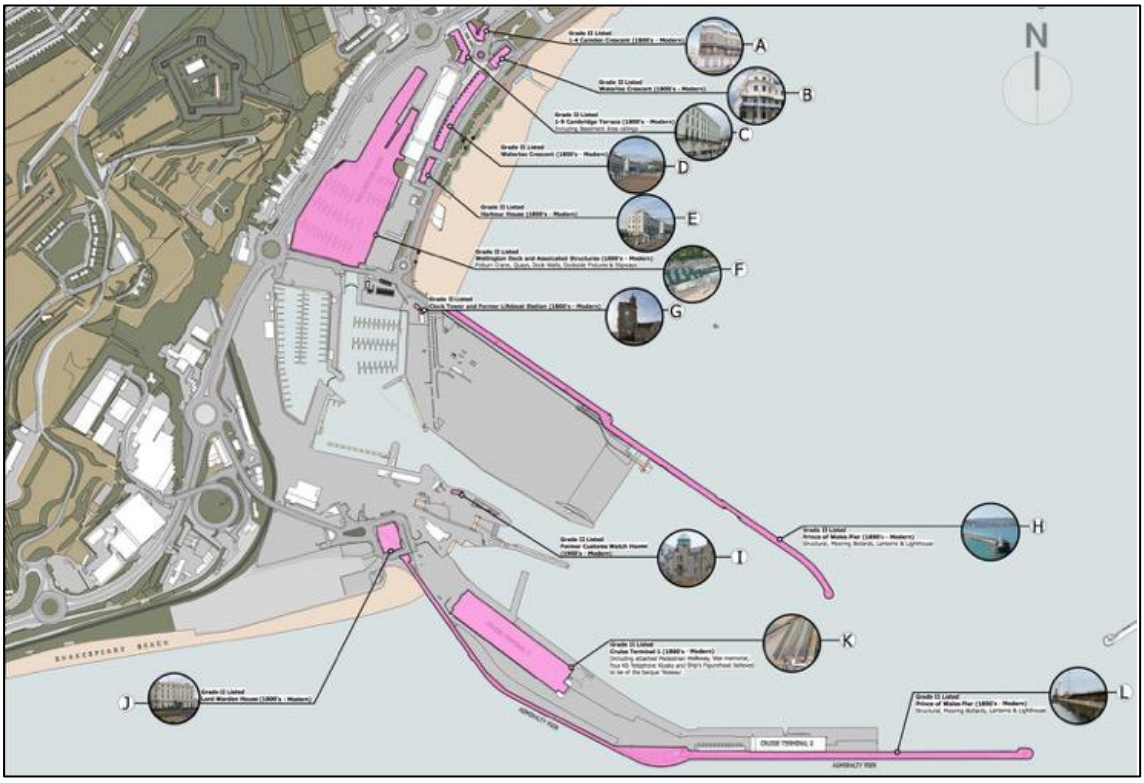
The DWDR LBC Applications submitted and anticipated to be submitted include:

1. Prince of Wales Pier, Enabling Works – Dec. 2015 (granted)
2. Prince of Wales Pier, Seaward Ramp, Landward Ramp & Berth Works - Feb. 2016 (granted)
3. Wellington Dock, Dock Entrance and Nav. Cut - May 2016 (granted)

B.6 Heritage Locations

B.6.1 Grade II Listed Buildings and Structures within DWDR Boundary

The site plan below records the location of Listed Buildings and Structures within the DWDR boundary.



These include:

A. 1-4 Camden Crescent
B. Waterloo Crescent
C. 1-9 Cambridge Terrace
D. Waterloo Crescent and Mansions
E. Harbour House
F. Wellington Dock and Assoc. Structures
    - Fairbairn Crane (on Esplanade Quay)
    - Quays
    - Dock Walls
    - Dockside Features and Slipways
G. Clock Tower and Former Lifeboat Stn.
H. Prince of Wales Pier
I. Former Customs Watch House
J. Lord Warden House
K. Cruise Terminal 1 including attached pedestrian walkway, war memorial, four K6 telephone kiosks and ships figurehead believed to be of the barque 'Rosseau'
L. Admiralty Pier and associated structures

The items affected by the DWDR scheme are F, G, H and I.

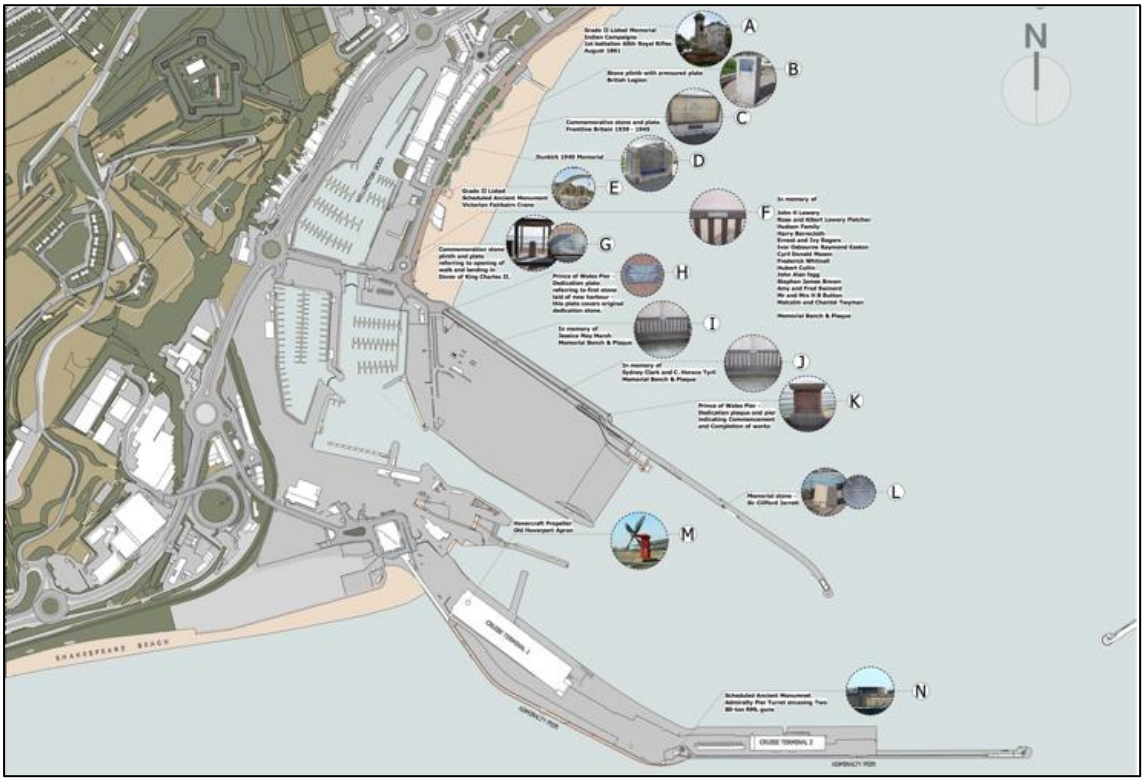
B.6.2 Monuments and Memorials within DWDR Boundary

The site plan opposite in Fig. 21 records the location of Monuments and Memorials within the DWDR Boundary.

These include:

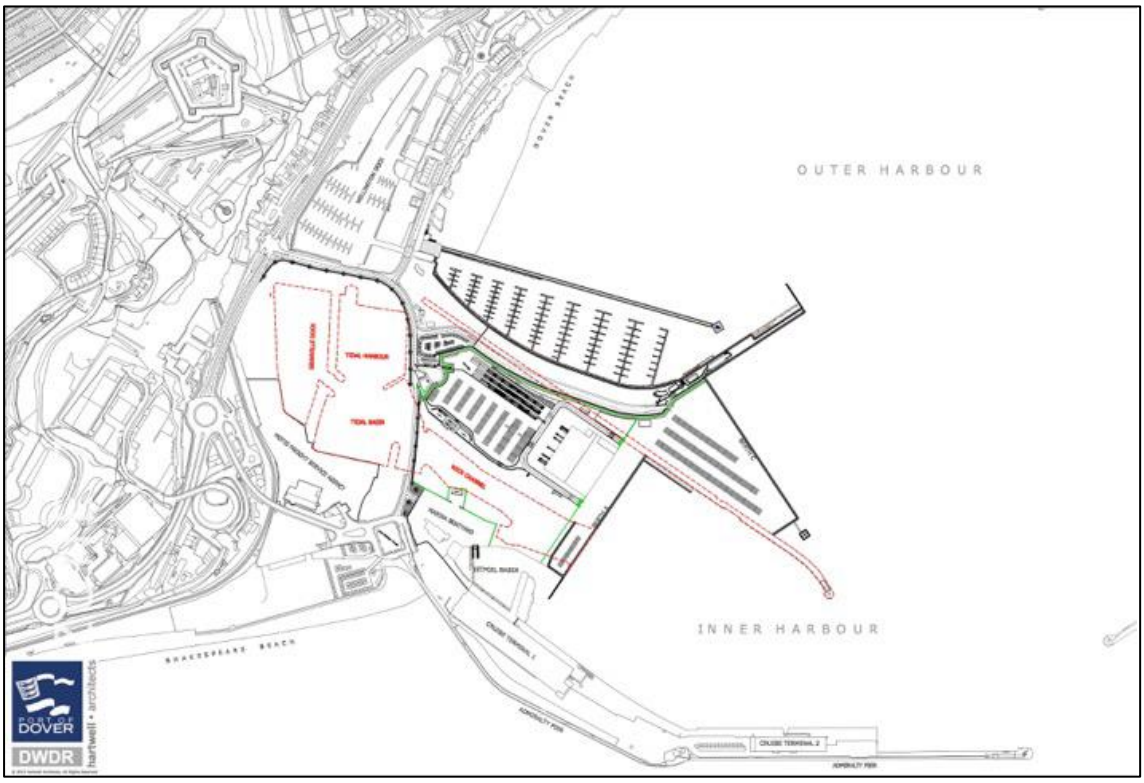
A. Grade II Listed Memorial, Indian Campaign 1st Battalion 60th Royal Rifles
B. Stone Plinth with armoured plate, British Legion
C. Commemorative Stone and Plate, Frontline Britain 1939-1945
D. Dunkirk 1940 Memorial
E. Grade II Listed Monument, Victorian Fairbairn Crane
F. Memorial Benches 14 No.
G. Commemoration stone plinth and plate re landing in Dover of King Charles II
H. Prince of Wales Pier Dedication plate referring to first stone laid of new harbour
I. Memorial Bench and Plaque – Jessica May Marsh
J. Memorial Bench and Plaque – Sydney Clark and C. Horace Tyril
K. Prince of Wales Pier Dedication Plaque
L. Memorial Stone – Sir Clifford Jarrett
M. Hovercraft Propeller – Recently relocated to Cruise Terminal 1 waiting for use within the DWDR Scheme
N. Scheduled Monument Pier Turret encasing 2No 80 ton RML guns

The items affected by the DWDR scheme are from E – M.



B.7 Demarcation lines of the Prince of Wales Pier and infilled existing docks

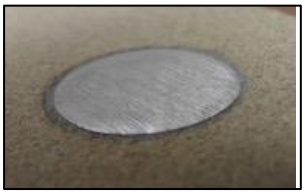
The site plan opposite in outlines the demarcation which in principle may be achieved within the scheme using the examples of methods and materials shown below.



Examples of Demarcation Method and Material for the Prince of Wales Pier and in filled Existing Docks.

Type A – Units (e.g. Setts/Polished Concrete Block Memorial or Stainless Steel Plaque)

Type B – Studs (e.g. Stainless Steel/Stone)



Appendix C – Initial VISSIM traffic modelling from TPHS

Dover VISSM Modelling

Network & Junction Performance Appraisal

Background

This note presents a comparison of the results of the VISSIM modelling work undertaken on behalf of Dover Harbour Board for a number of scenarios comprising different network configurations and / or flow demands. This comparison considers both network-wide and junction-specific performance.

In terms of the network configurations considered, these comprise the following:

1. 2015 baseline network (validated model), with no changes to the junctions;
2. 2015 revised network, which is as (1) and with signalisation of both the Prince of Wales and York Street junctions, as well as optimisation of the Woolcomber Street signals (A20 works);
3. 2026 network, with committed signals scheme for St James' Quarter development and with signalisation of both the Prince of Wales and York Street junctions, as well as optimisation of the Woolcomber Street signals (A20 works).

In terms of the flow scenarios, these comprise the following:

A. 2015 baseline flows (validated model);

B. 2026 'base' flows, including non-DHB development traffic (LDF, St James' Quarter and Western Heights / Farthingloe) but excluding DHB development traffic (Waterfront and WDR) and DHB port growth;

C. 2026 'full' flows, which is as (B) but including DHB development traffic and port growth.

The following matrix summarises the combined network / flows model runs for which network performance and junction performance data have been extracted.

		NETWORK		
		1	2	3
FLOWS	A	✓	✓	-
	B	-	-	✓
	C	-	-	✓

Table 1: Summary of Model Runs

All model scenarios incorporate TAP-control measures upstream from the Western Heights junction and a fully-operational port, to be consistent with the 2015 validated model, and data extracted from the p.m. period running from 16:30 through to 21:30 when the model is at its busiest.

Network Performance

The following table (Table 2) presents a series of overarching network performance statistics for each of the six model runs for the full five-hour period running from 16:30 to 21:30.

	MODEL RUN			
	1A	2A	3B	3C
Average delay time / vehicle (secs.)	905	909	622	669
Average number of stops / vehicle	2	2	2	4
Average speed (mph)	8	8	9	9
Average stopped delay / vehicle (secs.)	843	847	560	563
Total delay time (hours)	3394	3410	3694	4946
Number of vehicles in the network	116	112	129	389
Number of vehicles that have left the network	13390	13396	21238	26220
Total stopped delay (hours)	3163	3176	3323	4159
Total travel time (hours)	4450	4461	5101	6730

Table 2: Summary of Network Performance Statistics

Junction Performance

The following series of tables presents firstly a summary of the delay per vehicle at each of the Limekiln, Prince of Wales, York Street and Woolcomber Street junctions for the six model scenarios (Tables 3 and 4 for the 16:30-17:30 and 17:30-18:30 periods respectively) and secondly a summary of the average cumulative queue at each of these junctions (Tables 5 and 6 for the 16:30-17:30 and 17:30-18:30 periods respectively). Each table presents also the corresponding flow throughput.

The flow throughput (volume) is reported in vehicles, the delay per vehicle parameter is reported in seconds and the average queue parameter is reported in metres (to the nearest metre).

	Limekiln		Prince of Wales		York Street		Woolcomber Street	
	Volume	Delay	Volume	Delay	Volume	Delay	Volume	Delay
1A	1658	5.6	1499	2.8	1883	5.2	1643	10.0
2A	1657	5.5	1508	7.0	1902	14.8	1700	8.9
3B	1905	5.8	1733	4.2	2544	19.8	2620	15.0
3C	2497	9.4	2563	34.6	3036	24.1	3112	22.0

Table 3: Summary of A20 Junction Delay – 16:30-17:30

	Limekiln		Prince of Wales		York Street		Woolcomber Street	
	Volume	Delay	Volume	Delay	Volume	Delay	Volume	Delay
1A	1754	5.4	1633	2.8	1958	5.4	1744	10.2
2A	1755	5.6	1644	6.7	1961	14.0	1805	9.5
3B	2041	6.4	1916	4.8	2688	20.0	2798	16.1
3C	2548	22.7	2632	57.9	3056	24.2	3143	21.8

Table 4: Summary of A20 Junction Delay – 17:30-18:30

	Limekiln		Prince of Wales		York Street		Woolcomber Street	
	Volume	Queue	Volume	Queue	Volume	Queue	Volume	Queue
1A	1658	0	1499	0	1883	0	1643	5
2A	1657	0	1508	2	1902	6	1700	4
3B	1905	0	1733	1	2544	13	2620	10
3C	2497	1	2563	34	3036	19	3112	17

Table 5: Summary of A20 Junction Queues – 16:30-17:30

	Limekiln		Prince of Wales		York Street		Woolcomber Street	
	Volume	Queue	Volume	Queue	Volume	Queue	Volume	Queue
1A	1754	0	1633	0	1958	0	1744	5
2A	1755	0	1644	2	1961	6	1805	5
3B	2041	0	1916	1	2688	14	2798	11
3C	2548	12	2632	65	3056	19	3143	18

Table 6: Summary of A20 Junction Queues – 17:30-18:30

Scenario Data Comparison

The network performance statistics differ little between the 2015 validated base model (Scenario 1A) and the 2015 model with the revised network including the A20 works (Scenario 2A), as the likelihood of benefits being forthcoming from date of opening would not be realistic for schemes developed primarily to accommodate future traffic demands – both general traffic and DHB-related traffic.

As such, in terms of determining the role of the network improvements (both the committed St James' Quarter scheme and the series of A20 works) in future-proofing the network for increased traffic demands, comparisons have been undertaken between Scenario 3B (with non-DHB development traffic) and Scenario 2A and between Scenario 3C (as 3B but also with DHB development traffic and port growth) and Scenario 2A. The results of these comparisons are presented in Table 7.

	MODEL RUN					
	2A	3B	Change	2A	3C	Change
Average delay time / vehicle (secs.)	909	622	-287	909	669	-240
Average number of stops / vehicle	2	2	±0	2	4	+2
Average speed (mph)	8	9	+1	8	9	+1
Average stopped delay / vehicle (secs.)	847	560	-287	847	563	-284
Total delay time (hours)	3410	3694	+284	3410	4946	+1536
Number of vehicles in the network	112	129	+17	112	389	+277
Number of vehicles that have left network	13396	21238	+7842	13396	26220	+12824
Total stopped delay (hours)	3163	3323	+160	3163	4159	+996
Total travel time (hours)	4450	5101	+651	4450	6730	+2280

Table 7: Comparison of Network Performance Statistics

The above comparisons highlight the following:

- That with the committed works and the A20 works the Dover town centre network would be future-proofed to accommodate not only firstly the non-DHB development traffic but secondly the DHB development traffic and the DHB port growth.

- That with an additional 8,000 vehicles running through the network over a five-hour period (the additional non-DHB development traffic), the committed works and the A20 works support a marginal increase in network-wide speed and a reduction in average delay per vehicle approaching five minutes, with a similar reduction in stopped delay per vehicle.

- That with an additional 13,000 vehicles running through the network over a five-hour period (the additional non-DHB development traffic, the DHB development traffic and DHB port growth), the committed works and the A20 works continue to support a marginal increase in network-wide speed and a reduction in average delay of around four minutes.

- That the marginal increase in network-wide speed and the reduction in vehicle delay may not be as significant as anticipated, which likely reflect that the network performance statistics reflect the whole network and so include the operations of the TAP queue upstream of Western Heights and the movement of vehicles around the Terminal 1 area.

Similarly, the junction performance statistics differ little between the 2015 validated base model (Scenario 1A) and the 2015 model with the revised network including the A20 works (Scenario 2A), though there are marginal progressive increases in junction throughput running downstream from the Prince of Wales junction through to the Woolcomber Street junction as a result of the works which may be considered as an indication of more efficient working in terms of flows along the A20.

Again, in terms of determining the role of the network improvements (both the committed St James' Quarter scheme and the series of A20 works) in future-proofing the network for increased traffic demands, comparisons have been undertaken between Scenario 3B (with non-DHB development traffic) and Scenario 2A and between Scenario 3C (as 3B but also with DHB development traffic and port growth) and Scenario 2A in terms of junction delay and queueing at the Prince of Wales and York Street junctions. The results of these comparisons are presented in Tables 7 and 8.

	16:30-17:30				17:30-18:30			
	Prince of Wales		York Street		Prince of Wales		York Street	
	Volume	Delay	Volume	Delay	Volume	Delay	Volume	Delay
2A	1508	7.0	1902	14.8	1644	6.7	1961	14.0
3B	1733	4.2	2544	19.8	1916	4.8	2688	20.0
Change	+225	-2.8	+642	+5.0	+272	-1.9	+727	+6.0
2A	1508	7.0	1902	14.8	1644	6.7	1961	14.0
3C	2563	34.6	3036	24.1	2632	57.9	3056	24.2
Change	+1055	+27.6	+1134	+9.3	+988	+21.2	+1095	+10.2

Table 7: Comparison of Junction Delay

	16:30-17:30				17:30-18:30			
	Prince of Wales		York Street		Prince of Wales		York Street	
	Volume	Queue	Volume	Queue	Volume	Queue	Volume	Queue
2A	1508	2	1902	6	1644	2	1961	6
3B	1733	1	2544	13	1916	1	2688	14
Change	+225	-1	+642	+7	+272	-1	+727	+8
2A	1508	2	1902	6	1644	2	1961	6
3C	2563	34	3036	19	2632	65	3056	19
Change	+1055	+32	+1134	+13	+988	+63	+1095	+13

Table 8: Comparison of Junction Queueing

- That with an additional 200-300 vehicles (the additional non-DHB development traffic) running through the Prince of Wales junction during each of the busiest two hours, the committed works and the A20 works support a marginal decrease in average delay per vehicle (of two to three seconds) and no material change in the limited extent of queueing.

- That with an additional 1,000 vehicles (the additional non-DHB development traffic, the DHB development traffic and DHB port growth) running through the Prince of Wales junction during each of the busiest two hours, the committed works and the A20 works would limit the increase in delay to no more than a half-minute typically and the increase in cumulative queueing around the junction to no more than around 60m.

- That with an additional 600-700 vehicles (the additional non-DHB development traffic) running through the York Street junction during each of the busiest two hours, the committed works and the A20 works would limit the increase in delay to six seconds typically and would limit the increase in cumulative queueing around the junction to no more than10m..

- That with an additional 1,000 vehicles (the additional non-DHB development traffic, the DHB development traffic and DHB port growth) running through the York Street junction during each of the busiest two hours, the committed works and the A20 works would limit the increase in delay to around ten seconds and the increase in cumulative queueing around the junction to no more than around 15m.

- That whilst there would be evident increases in delay per vehicle and junction queueing at the Prince of Wales and York Street junction as a result of the changing configurations (from roundabout junctions to signal-controlled junctions), these would be relatively minor in magnitude given the additional traffic flows which the works would accommodate.

Appendix D – Additional note on traffic modelling from TPHS

Project Title: Dover A20 Business Case

Topic Area: VISSIM Modelling Background

Date: December 2016

Reference: TPHS/133/TN01

1 Background

1.1.1 This note has been prepared to provide background to the VISSIM modelling for the A20 corridor (and extending into the Terminal 1 area) undertaken by TPHS on behalf of Dover Harbour Board, which commenced during 2015.

1.1.2 Previous modelling of the A20 corridor was undertaken by Halcrow Group Limited in relation to the Terminal 2 (T2) proposals which were the subject of the Harbour Revision Order (HRO) application. Detailed modelling of the A20 corridor for the previous T2 proposals was last undertaken based on traffic flows and counts from 2006 / 2007 base year, whilst detailed modelling of the Terminal 1 area was last undertaken based on port operations in 2010.

1.1.3 Specifically with regard to the modelling of the A20 corridor, the model developed in support of the HRO application firstly underwent a validation exercise, with the Highways Agency (as then named) and their consultants (then Parsons Brinckerhoff) confirming both the base model and subsequent future year models developed from the validated base as fit for purpose for the testing of future changes in network infrastructure and in network flows.

1.1.4 Since this previous modelling, there was evidence that traffic demands and flows along the A20 have fluctuated and reduced and that previous data sets and development assumptions from the earlier agreed modelling had not materialised on the ground in terms of development and their corresponding vehicle trips.

1.1.5 As such, it was considered that given the evident dated nature of the previous modelling and the background data, there would be considerable benefit in updating the modelling for both the A20 corridor and the Terminal 1 and bringing forward this updated model as a single detailed composite model to better represent current conditions throughout.

2 Base Model Development

2.1.1 Using the validated and agreed original A20 and Terminal 1 models as a starting point, a new composite 2015 model has been developed and it is from this base model that subsequent future year scenarios in terms of assessing changes to network infrastructure and / or traffic demands have been taken forward.

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2.1.2 Given that the single composite 2015 model represented effectively a new model, albeit using an earlier validated and agreed as a starting point, the base model went through a validation exercise prior to being used to assess future changes in network infrastructure and / or network flows. This exercise culminated in the preparation of a Local Model Validation Report (LMVR) submitted to Highways England and their consultants (Atkins).

2.1.3 The development of the updated base model, when compared to the previous models as referenced within the background, can be summarised into changes relating to the network infrastructure and changes relating to the traffic flows. The key changes relating to each for the base 2015 model are as follow:

Infrastructure

- base mapping reviewed, together with site observations, to more accurately reflect current on-street arrangements;
- updated signal timings obtained for signal-controlled junctions to reflect current scenarios in SCOOT;
- inclusion of TAP traffic management controls, these being the lane discipline parameters and the additional signal control at Western Heights;
- removal of weighbridges within the Terminal 1 area and changes to the check-in times to reflect introduction of exit checks.

Traffic Flows

- background traffic flows fully updated to reflect current conditions, based on series of 18-hour video surveys undertaken during April 2015;
- survey scheduling to ensure that background data including cruise-related activity;
- traffic flows reflect TAP traffic management controls, with predominant use of nearside lane by HGVs during a.m. period and controlled release of HGVs during p.m. period;
- additional observations undertaken of pedestrian demand at stand-alone signal-controlled crossings along A20.

2.1.4 The updated validation demonstrated that with the key changes to both the network infrastructure and the network flows the updated base 2015 model set continues to be a well-validated highway assignment model in accordance with the criteria set out within the Department for Transport guidance and thus become the validated model.

2.1.5 The traffic flow validation criteria adopted for the updated 2015 base model corresponded with the model validation criteria for traffic flows (links and turning movements) set out in Department for Transport's Transport Analysis Guidance 'TAG Unit M3.1 *'Highway Assignment Modelling'*, with a further validation criterion outside of the WebTAG process (for 100% of all individual flows to have a GEH value of less than 10) included as good practice.

2.1.6 As the LMVR concluded, following a series of checks it had been considered that the updated base 2015 models reflect the traffic conditions and behaviour along the A20 corridor, around the Dover town centre area and within the port itself to a good degree under current conditions, thus providing a sound base upon which to test options and scenarios and gain some understanding of changes in traffic behaviour as a result.

2.1.7 This position was agreed with Highways England and their consultants (Atkins), with the updated 2015 models since taken forward for modelling of planned scenarios such as the temporary traffic management arrangements for the recent and ongoing works along the A20 to convert the Prince of Wales and York Street roundabouts to signal-controlled junctions.

3 Future Year Model Development

3.1.1 A key reason for developing a new and validated base 2015 model was to provide a fully co-ordinated A20 and Terminal 1 model upon which to assess a number of future-year scenarios with corresponding changes to both infrastructure and traffic demands, of which a significant number of the changes differed from the future-year considerations assessed using the original models which supported the HRO application. These key changes have been as follow:

Infrastructure

- alternative future year network with 'interim scheme' for the Prince of Wales signalisation, reflecting outcome of discussions between Highways England and the client's design team.

Traffic Flows

- LDF forecasts have been halved from the estimated demand matrices for the previous Dover Transport Model (DTM), thus assumed to have 50% of LDF development built-out by 2026, which is considered to continue to provide an over-estimate;
- St James' Quarter development scheme modelled using most up-to-date information from the Transport Assessment prepared for the consented scheme now being built out;
- Western Heights / Farthingloe development scheme modelled using flows from the corresponding Transport Assessment, as committed scheme not considered by DTM;
- Dover Western Docks Revival scheme modelled as a distinct development zone, again not considered by the DTM, using assessment flows prepared for the EIA screening opinion;
- port growth reviewed and recalibrated from the current base, then forecasted forward through to 2026 based on a rate of 2.5% per annum (representing high growth).

3.1.2 *With regard to infrastructure changes*, as well as coming forward with the revised scheme arrangements for the Prince of Wales signalisation (as currently being built-out) the future year models also brought forward the consented signalisation scheme to support the St James' Quarter development, the planned signalisation of the York Street roundabout (as currently being built-out) and the planned optimisation of the existing Woolcomber Street signalised junction and linkage with the works at Prince of Wales and York Street.

3.1.3 These latter infrastructure references reflect changes between the updated validated base 2015 model and the future year assessment models, but not materially from the future year changes previously considered within the original HRO future year models. Given that the works along the A20 are currently being built-out (due for completion early 2017) and that the St James' Quarter scheme is a consented scheme, this forms part of the core scenario.

3.1.4 *With regard to the LDF flows*, the principle of including traffic associated with the LDF development assumptions is no different to that adopted with the previous future years modelling undertaken for the HRO application, with only the level of LDF-associated traffic differing between the current future year modelling and the previous future year modelling.

3.1.5 Similarly, the development of the LDF traffic flows for the current future year modelling was no different to the approach adopted for the previous future year modelling, using the cordoned matrices for the 2007 reference case and the future year 20026 case (relating to LDF Option 3) from the Dover Transport Model developed by WSP; these model flows had been fully audited and approved by the local regulators as 'fit for purpose' with the DTM.

3.1.6 LDF Option 3 allowed for the delivery of 10,000 residential dwellings within the period of the Core Strategy, thus running between 2006 and 2026.

3.1.7 As with the previous future year modelling work, those trips within cordoned matrices to and from specific development zones for which separate and bespoke traffic flows were to be developed and inserted were set to zero within the current future year modelling. Such zones relate to the St James' Quarter development area, the Western Docks and Waterfront area.

3.1.8 The difference between the previous future year modelling and the current future year modelling in terms of the development of the LDF flows is that whereas for the former the full difference between the 2026 and 2007 matrices was taken forward (100% delivery of LDF – Option 3) for the latter only half of the difference between the 2026 and 2007 was taken forward (50% delivery of LDF – Option 3).

3.1.9 This approach is validated by the current rate of delivery of housing stock within the Dover District Council area, as reported upon within the Council's Authority Monitoring Report 2014/15 (December 2015). This monitoring recorded that since the start of the current Core Strategy period (2006) there had been 2,428 housing completions against a target of 4,545, thus the completions equating to around half of the target over the same period.

3.1.10 Given that at this stage of the Core Strategy period it has been demonstrated that around half of planned development has been developed, it is considered reasonable to assume that by the end of the Core Strategy similarly around half of the planned development (5,000 homes out of the 10,000 homes) would be *'more than likely'* to be realised, though with some uncertainty, and thus should form part of the core scenario in line with WebTAG Unit M4.

3.1.11 Whilst it continues to be the aspiration of Dover District Council to have the full 10,000 homes delivered, and that this outcome may arise over time, given the current rate of delivery it is considered reasonable to assume that there is significant uncertainty as to whether more than half of the development aspirations would be delivered by the end of the Core Strategy period and thus exclude from the core scenario, again in line with WebTAG Unit M4.

3.1.12 *With regard to the St James' Quarter flows*, again, the principle of including traffic associated with this committed development scheme is no different to that adopted with the previous future years modelling undertaken for the HRO application, with similarly only the level of traffic differing between the current future year modelling and the previous modelling.

3.1.13 The previous future year modelling incorporated development-related traffic to reflect those trips presented for the scheme within the Transport Assessment (August 2005) and Transport Statement (July 2006) reports, both prepared by Cottee Transport Planning in relation to a mixed-use development. To reflect the changes to the development scheme, the current future year modelling incorporated development-related traffic to reflect those trips presented within the Transport Assessment (October 2013) report, again prepared by Cottee.

3.1.14 As a consented development scheme, the inclusion of this as part of the core scenario reflects the guidance presented in WebTAG Unit M4 as it is 'near certain' that the scheme will come forward, particularly given that the groundworks to support the scheme have commenced.

3.1.15 *With regard to the Western Heights / Farthingloe flows*, this scheme was neither known as a committed development scheme nor as part of the LDF development sites at the time of the previous future year modelling, thus with no consideration. However, between that modelling and the current future year modelling, consent has been issued by Dover District Council for a primarily residential scheme for the Western Heights / Farthingloe site, but not then built-out, thus it represents a further major committed development scheme.

3.1.16 Whilst not considered within the previous future year modelling, the methodology adopted to develop the flows for this committed development scheme within the current future year modelling is no different to that adopted for the development of the flows for the St James' Quarter scheme, thus with the current future year modelling incorporating development-related traffic to reflect those trips presented for the scheme in the Transport Assessment (May 2012) report prepared by WSP.

3.1.17 Again, as a consented development scheme, the inclusion of this as part of the core scenario reflects the guidance presented in WebTAG Unit M4 as it is 'near certain' that the scheme will come forward. This scheme is also referenced within the Council's Monitoring Report.

3.1.18 *With regard to the Dover Western Docks Revival (DWDR) flows*, this scheme was neither a developer-led or LDF development aspiration at the time of the previous future year modelling, as the area across which this scheme would be coming forward comprises that across which the proposed Terminal 2 to which that modelling work related was to sit. With Terminal 2 not coming forward, the area is currently proposed for alternative development.

3.1.19 At the time of the start of current future year modelling whilst initial plans had been developed for the DWDR development area and taken through an EIA screening opinion, there had been no build-out or completion of the initial phase(s) of development. This continues to be the scenario on the ground, with further work being undertaken to bring forward the initial phase(s) of development and masterplan later phases of development.

3.1.20 For the purpose of the current future year modelling the projected traffic flows put forward within the EIA screening opinion for the initial phase(s) of development within the DWDR area were incorporated, with these traffic projections having been based on a combination of TRICS-based data and operator-specific data (the latter provided by Dover Harbour Board). As further information becomes known, this area of the modelling would be updated.

3.1.21 The initial development phase(s) within the DWDR area have been the subject of an EIA screening opinion and subsequently groundworks have been and are continuing to be undertaken in relation to the corresponding development plots. Also, the delivery of these development phases can be undertaken under the HRO consent, thus against the background of these circumstances it is considered reasonable to assume that at least the initial phase(s) would be *'more than likely'* to be realised, thus again should form part of the core scenario in line with the *'Classification of Future Inputs'* put forward within WebTAG Unit M4.

3.1.22 As referenced, there will be further development phases coming forward within the wider DWDR area, but at this stage these plans are subject to further masterplanning and detailing, thus again it is considered reasonable to classify this additional development as a scheme which may happen within the *'reasonably foreseeable'* future.

3.1.23 *With regard to the port growth flows*, again, the principle of including traffic associated with the continued growth of port-based activity is no different to that adopted with the previous future years modelling undertaken for the HRO application, but the methodology of incorporating this updated within the current future year modelling to reflect that in lieu of the delivery of Terminal 2 port growth traffic would be to and from Terminal 1 only.

3.1.24 To develop the additional traffic associated with port growth from the 'current' year through to the future year (2026), updated growth forecasts were provided by Dover Harbour Board in relation to three scenarios – low growth, medium growth, high growth; the latter (high growth) equated to port-related traffic increasing by 2.5% per annum.

3.1.25 The updated validated base model provided the 'current' year flows in terms of traffic to and from the port (Terminal 1) and it was from this that additional traffic movements equivalent to 2.5% per annum growth between the 'current' year and the future year were determined. These additional movements were then incorporated into the current future year modelling to provide an appropriate level of traffic movements routing to and from the port area.

3.1.26 As an existing development site continually growing in terms of traffic activity on a year-by-year basis, though with growth per annum partly fluctuating to reflect the prevailing economic conditions, the inclusion of the additional traffic relating to port growth as part of the core scenario reflects the guidance presented in WebTAG Unit M4 as it is 'near certain' that growth at the port will continue and traffic flows to and from Terminal 1 will increase.

3.1.27 *With regard to flow changes*, as well as coming forward with those revised and / or additional flow sets within the current future year modelling, when compared to the previous future year modelling, the current future year modelling also retained traffic movements to and from the Wellington Dock regeneration area without material modification from the previous future year modelling. Whilst this additional flow set reflects a change between the updated validated base 2015 model and the future year assessment models, it had been considered as one of the future year changes previously considered within the original future year models.

3.1.28 Notwithstanding that traffic associated with the proposed redevelopment of the Wellington Dock area is carried forward from the previous future year modelling, with the inclusion in that modelling agreed with the regulators including the Highways Agency (as then) and their consultants, against the background of the *'Classification of Future Inputs'* put forward within WebTAG Unit M4 it is considered reasonable to assume that this scheme would *'more than likely'* come forward, as the development team have been reviewing the area's masterplan.

4 Summary

4.1.1 This note sets out the background to the development of the updated 2015 base model, confirming how this was developed from the earlier validated model taken through the earlier HRO process, referencing the key changes between the previous validated base model and the updated validated base model in terms of infrastructure changes and traffic flow changes.

4.1.2 It outlines the validation process through which the updated 2015 base model passed with regard to the WebTAG guidance and how subsequently it has been used to test a number of planned scenarios relating to the current works along the A20 in agreements with both Highways England and their consultants (Atkins).

4.1.3 Moving on from the updated validated base model, the note then sets out how the future year model set have been developed, confirming as appropriate how this has followed the general methodology used and principles adopted to develop the future year model set previously and then setting out how a number of changes have been incorporated as they relate to infrastructure and traffic flow components.

4.1.4 For each of the infrastructure and traffic flow components incorporated into the future year model set, the note has outlined how these cross-reference with the WebTAG guidance as to those elements which should be considered within a core scenario and to those elements which should not be considered within the core scenario, which confirms that the approach adopted for the development of the future year model set is consistent with guidance.

Appendix E – Total traffic hours saved by year (scenario 3C)

Year	Volume	Ave. delay	Total delay	Ave. saved	Total saved
		sec	hrs	sec	hrs
2015	13390	905	3366	0	0
2016	13843	905	3480	0	0
2017	14296	909	3610	-4	-16
2018	15621	622	2699	283	1228
2019	16946	622	2928	283	1332
2020	18271	622	3157	283	1436
2021	19596	622	3386	283	1540
2022	20921	622	3615	283	1645
2023	22246	634	3918	271	1675
2024	23571	646	4230	259	1696
2025	24896	658	4550	247	1708
2026	26220	669	4873	236	1719

StJ	7848	9	872 from 2018 onwards
DWDR/Port	4982	11	453 from 2016 onwards
Delay incr	47	4	12 from 2023 onwards

Appendix F – Total traffic hours saved by year (scenario 3B)

Year	Volume	Ave. delay	Total delay	Ave. saved	Total saved
		sec	hrs	sec	hrs
2015	13390	905	3366	0	0
2016	13390	905	3366	0	0
2017	13390	909	3381	-4	-15
2018	14262	622	2464	283	1121
2019	15134	622	2615	283	1190
2020	16006	622	2765	283	1258
2021	16878	622	2916	283	1327
2022	17750	622	3067	283	1395
2023	18622	622	3217	283	1464
2024	19494	622	3368	283	1532
2025	20366	622	3519	283	1601
2026	21237	622	3669	283	1669

StJ	7848	9	872 from 2018 onwards
DWDR/Port	0	0	0 from 2016 onwards
Delay incr	0	0	0 from 2023 onwards

Appendix G – Revised VISSIM traffic modelling from TPHS

Dover VISSM Modelling

Network & Junction Performance Appraisal

Background

This note presents a comparison of the results of additional VISSIM modelling work undertaken on behalf of Dover Harbour Board, developed from the scenarios comprising different network configurations and / or flow demands considered during an earlier modelling series undertaken and reported upon during November 2016.

To be consistent with the reporting of that earlier modelling series, this comparison considers again both network-wide and junction-specific performance.

In terms of the network configurations considered, which have been developed further from those utilised for the earlier modelling series, these comprise the following:

1. 2015 baseline network, with no changes to the junctions, as carried forward from the validated model and the earlier modelling, but with modification to the TAP controls such that when in operation a platoon of HGVs are released every three minutes (twenty cycles / hour);

3. 2026 network, with committed signals scheme for St James' Quarter development and with signalisation of both the Prince of Wales and York Street junctions, as well as optimisation of the Woolcomber Street signals (A20 works), as for the earlier modelling, but with the same modification to the TAP controls as with Network 1 (above).

In terms of the flow scenarios, these comprise the following:

A. 2015 baseline flows, as carried forward from the validated model and the earlier modelling for non-port traffic, but with port traffic increased to correspond with concurrent busy freight conditions (around 5,000 HGVs daily) and busy tourist conditions (around 8,000 cars daily) and TAP release per cycle increased to up to 14 HGVs per cycle;

C. 2026 'full' flows, which includes both non-DHB development traffic (LDF, St James' Quarter and Western Heights / Farthingloe) and DHB development traffic, as well as port growth, and with TP release per cycle increased to up to 18 HGVs per cycle.

The following matrix summarises the alternative combined network / flows model runs for which network performance and junction performance data have been extracted.

		NETWORK	
		1	3
FLOWS	A	✓	-
	C	✓	✓

Table 1: Summary of Alternative Runs

Network Performance

The following table (Table 2) presents a series of overarching network performance statistics for each of the combined model scenarios for the single hour running from 16:30 to 17:30, which represents the overlap between the start of the early-evening busy period for background traffic and the end of busy afternoon period for port-related traffic.

	MODEL RUN		
	1A	1C	3C
Average delay time / vehicle (secs.)	207	258	226
Average number of stops / vehicle	5	5	5
Average speed (mph)	18	16	17
Average stopped delay / vehicle (secs.)	67	61	80
Total delay time (hours)	242	562	490
Number of vehicles in the network	516	1177	1021
Number of vehicles that have left the network	3683	6668	6785
Total stopped delay (hours)	78	134	173
Total travel time (hours)	559	1098	996

Table 2: Summary of Network Performance Statistics

Junction Performance

A summary firstly of the delay per vehicle at each of the Limekiln, Prince of Wales, York Street and Woolcomber Street junctions for the three model scenarios for the same hour-long period as for the network performance evaluation (16:30-17:30) is presented in Table 3, whilst a summary secondly of the average cumulative queue at each of these junctions for the same hour-long period is presented in Table 4. Each table presents also the corresponding flow throughput.

The flow throughput (volume) is reported in vehicles, the delay per vehicle parameter is reported in seconds and the average queue parameter is reported in metres (to the nearest metre).

	Limekiln		Prince of Wales		York Street		Woolcomber Street	
	Volume	Delay	Volume	Delay	Volume	Delay	Volume	Delay
1A	1940	6.7	1780	3.2	2312	7.7	2100	11.8
1C	2567	9.2	2629	7.7	3059	20.00	3004	16.1
3C	2902	18.2	2961	34.2	3426	46.3	3469	30.6

Table 3: Summary of A20 Junction Delay – 16:30-17:30

	Limekiln		Prince of Wales		York Street		Woolcomber Street	
	Volume	Queue	Volume	Queue	Volume	Queue	Volume	Queue
1A	1940	0	1780	0	2312	1	2100	7
1C	2657	0	2629	0	3059	8	3004	14
3C	2902	4	2961	34	3426	61	3469	40

Table 4: Summary of A20 Junction Queue – 16:30-17:30

Scenario Data Comparison

In terms of determining the role of the network improvements (both the committed St James' Quarter scheme and the series of A20 works) in future-proofing the network for increased traffic demands, comparisons have been undertaken firstly between Scenario 1A (the current baseline) and 3C (the future year with the works in place) and secondly between Scenario 1C (the future year without the works in place) and Scenario 3C (the future year with the works in place).

The results of these comparisons are presented in Table 5 for the single hour of 16:30 to 17:30.

	MODEL RUN					
	1A	3C	Change	1C	3C	Change
Average delay time / vehicle (secs.)	207	226	+19	258	226	-32
Average number of stops / vehicle	5	5	±0	5	5	±0
Average speed (mph)	18	17	-1	16	17	+1
Average stopped delay / vehicle (secs.)	67	80	+13	61	80	+19
Total delay time (hours)	242	490	+248	562	490	-72
Number of vehicles in the network	516	1021	+505	1177	1021	-156
Number of vehicles that have left network	3683	6785	+3102	6668	6785	+117
Total stopped delay (hours)	78	173	+95	134	173	+39
Total travel time (hours)	559	996	437	1098	996	-102

Table 5: Comparison of Network Performance Statistics

The above comparisons highlight the following:

- That whilst the baseline network, thus without any works junctions to either the A20 or town centre junctions, would have the scope to accommodate additional traffic relating to both non-DHB and DHB development traffic, the magnitude of this additional traffic would be greater with the works having been undertaken, so better future-proofing the network.

- That with an additional 3,000 or so vehicles running through the network over the hour-long period, when comparing the current baseline with the future year conditions with the junction works having been undertaken, average delay per vehicle would only increase by 19 seconds and with no material change in average speed of travel or number of stops for vehicles.

- That the increase in average delay per vehicle which would arise as a result of the additional traffic in any event would be reduced as a result of the junction works along the A20 and within the town centre, with this being around 30 seconds less under these future year flows (and indeed with around 100 more vehicles) with the works in place than without the works.

- That with around 100 or more so vehicles running through the network over the hour-long period, when comparing the future year scenarios, again there would continue to be no material change in either average speed of travel or number of stops for vehicles.

Again, in terms of determining the role of the network improvements (both the committed St James' Quarter scheme and the series of A20 works) in future-proofing the network for increased traffic demands, comparisons have been undertaken again firstly between Scenario 1A (the current baseline) and 3C (the future year with the works in place) and secondly between Scenario 1C (the future year without the works in place) and Scenario 3C (the future year with the works in place) in terms of junction delay and queueing at each of the key junctions along the A20 corridor.

The results of these comparisons are presented in Tables 6 and 7 for the single hour of 16:30 to 17:30 for junction delay and queueing respectively.

	Limekiln		Prince of Wales		York Street		Woolcomber Street	
	Volume	Delay	Volume	Delay	Volume	Delay	Volume	Delay
1A	1940	6.7	1780	3.2	2312	7.7	2100	11.8
3C	2902	18.2	2961	34.2	3426	46.3	3469	30.6
Change	+962	+11.5	+1181	+31.0	+1114	+38.6	+1369	+18.8
1C	2567	9.2	2629	7.7	3059	20.0	3004	16.1
3C	2902	18.2	2961	34.2	3426	46.3	3469	30.6
Change	+335	+9.0	+332	+26.5	+367	+26.3	+465	+14.5

Table 6: Comparison of Junction Delay

	Limekiln		Prince of Wales		York Street		Woolcomber Street	
	Volume	Queue	Volume	Queue	Volume	Queue	Volume	Queue
1A	1940	0	1780	0	2312	1	2100	7
3C	2902	4	2961	34	3426	61	3469	40
Change	+962	+4	+1181	+34	+1114	+60	+1369	+33
1C	2567	0	2629	0	3059	8	3004	14
3C	2902	4	2961	34	3426	61	3469	40
Change	+335	+4	+332	+34	+367	+53	+465	+26

Table 7: Comparison of Junction Queueing

- That whilst at each of the junctions along the A20 the average delay per vehicle and the average extent of queueing would increase as a result of the works to the junctions along the A20 and within the town centre, when compared with the current baseline, these would correspond with significantly increased junction throughput within the future year.

- Additionally, whilst there would be also an increase in average delay per vehicle and extent of queueing at each of the A20 junction, when comparing the future year scenario with the works in place with the future year scenario without the works in place, these would continue to correspond with increased hourly junction throughput of between 350 and 450 vehicles.

- That whilst there would be evident increases in delay per vehicle and junction queueing at the Prince of Wales and York Street junctions as a result of the changing configurations (from roundabout junctions to signal-controlled junctions), these would be manageable and should be considered against the background of network performance and traffic flows.

Appendix H – Additional information from TPHS

This exercise was seeking to ascertain how much of the benefit seen between Scenarios 1C and 3C could be considered to be as a result of the committed St James' Quarter junction and how much as a result of the A20 works.

The following table summarises the network performance statistics of both the previous Scenarios 1C and 3C and the new intervening scenario (referenced as 5C).

	MODEL RUN		
	1C	**5C**	3C
Average delay time / vehicle (secs.)	258	**274**	226
Average number of stops / vehicle	5	**5**	5
Average speed (mph)	16	**15**	17
Average stopped delay / vehicle (secs.)	61	**89**	80
Total delay time (hours)	562	**569**	490
Number of vehicles in the network	1177	**1191**	1021
No. of vehicles that have left the network	6668	**6273**	6785
Total stopped delay (hours)	134	**185**	173
Total travel time (hours)	1098	**1043**	996

Summary of Network Performance Statistics

As you will note, bringing forward the committed signals scheme at the St James' Quarter only may, under the modelled set of traffic flows, result in an overall network performance worse than both the scenario of not doing any works and the scenario of also having the works undertaken along the A20.

This overarching result reflects the role of the existing Woolcomber Street signals in the management of traffic, particularly in relation to seeking to maximise benefit to the A20 mainline in contrast to the town centre.

Under the interim scenario, with the increased volume in general of port-related traffic and the more frequent releases of TAP platoons, but with the retention of the roundabout junctions at Prince of Wales and York Street resulting in these flows arriving at the Woolcomber Street junction in a less regulated manner, the signals are having to provide higher green time (and thus capacity) to the mainline to best manage the demand.

As a result, this leads to less green time (and similarly capacity) to accommodate the town centre traffic (including the development traffic from St James' Quarter), which leads to congestion in that area.

Under the Scenario 3C, whilst there continues to be the increased volume and TAP releases, these flows arrive at the Woolcomber Street junction in a more regulated manner as a result of the signals at Prince of Wales and York Street junctions effectively controlling the traffic (hence the junction delays) and allowing the Woolcomber Street signals to better balance the distribution of green time between the requirements of the mainline and of the town centre network.

As a result, this leads to more green time being available to accommodate the town centre traffic and work better, though not in full co-ordination with the town centre junction controls, thus allowing this network to work better in tandem to that along the A20.

In summary, under this particular flow scenario, it could be argued that the majority (if not all) of the benefit previously seen between Scenarios 1C and 3C could be attributed to the proposed works along the A20, with the benefit potentially being greater given that the works at St James' Quarter alone may not assist under such overall traffic volumes.

Appendix I – Total traffic hours by year (scenario 1C)

Year	Volume	Ave. delay	Total delay	Ave. saved	Total saved
		sec	hrs	sec	hrs
2015	3683	207	212	0	0
2016	3796	207	218	0	0
2017	3909	207	225	0	0
2018	4229	213	250	-6	-7
2019	4549	219	277	-12	-15
2020	4869	225	304	-18	-24
2021	5189	231	333	-24	-35
2022	5509	237	363	-30	-46
2023	5829	243	393	-36	-58
2024	6149	249	425	-42	-72
2025	6469	255	458	-48	-86
2026	6788	258	486	-51	-96
2027	7107	264	521	-57	-113
2028	7426	270	557	-63	-130
2029	7745	276	594	-69	-148
2030	8064	282	632	-75	-168
2031	8383	288	671	-81	-189
2032	8702	294	711	-87	-210
2033	9021	300	752	-93	-233
2034	9340	306	794	-99	-257
2035	9659	312	837	-105	-282
2036	9978	318	881	-111	-308
2037	10297	324	927	-117	-335
2038	10616	330	973	-123	-363
2039	10935	336	1021	-129	-392
2040	11254	342	1069	-135	-422
2041	11573	348	1119	-141	-453
2042	11892	354	1169	-147	-486
2043	12211	360	1221	-153	-519
2044	12530	366	1274	-159	-553
2045	12849	372	1328	-165	-589
2046	13168	378	1383	-171	-625
2047	13487	384	1439	-177	-663
2048	13806	390	1496	-183	-702
2049	14125	396	1554	-189	-742
2050	14444	402	1613	-195	-782
2051	14763	408	1673	-201	-824
2052	15082	414	1734	-207	-867
2053	15401	420	1797	-213	-911
2054	15720	426	1860	-219	-956
2055	16039	432	1925	-225	-1002
2056	16358	438	1990	-231	-1050

Appendix J – Total traffic hours by year (scenario 5C)

Year	Volume	Ave. delay	Total delay	Ave. saved	Total saved
		sec	hrs	sec	hrs
2015	3683	207	212	0	0
2016	3796	207	218	0	0
2017	3909	207	225	0	0
2018	4229	215	253	-8	-9
2019	4549	223	282	-16	-20
2020	4869	231	312	-24	-32
2021	5189	239	344	-32	-46
2022	5509	247	378	-40	-61
2023	5829	255	413	-48	-78
2024	6149	263	449	-56	-96
2025	6469	271	487	-64	-115
2026	6788	274	517	-67	-126
2027	7107	282	557	-75	-148
2028	7426	290	598	-83	-171
2029	7745	298	641	-91	-196
2030	8064	306	685	-99	-222
2031	8383	314	731	-107	-249
2032	8702	322	778	-115	-278
2033	9021	330	827	-123	-308
2034	9340	338	877	-131	-340
2035	9659	346	928	-139	-373
2036	9978	354	981	-147	-407
2037	10297	362	1035	-155	-443
2038	10616	370	1091	-163	-481
2039	10935	378	1148	-171	-519
2040	11254	386	1207	-179	-560
2041	11573	394	1267	-187	-601
2042	11892	402	1328	-195	-644
2043	12211	410	1391	-203	-689
2044	12530	418	1455	-211	-734
2045	12849	426	1520	-219	-782
2046	13168	434	1587	-227	-830
2047	13487	442	1656	-235	-880
2048	13806	450	1726	-243	-932
2049	14125	458	1797	-251	-985
2050	14444	466	1870	-259	-1039
2051	14763	474	1944	-267	-1095
2052	15082	482	2019	-275	-1152
2053	15401	490	2096	-283	-1211
2054	15720	498	2175	-291	-1271
2055	16039	506	2254	-299	-1332
2056	16358	514	2336	-307	-1395

Appendix K – Total traffic hours by year (scenario 3C)

Year	Volume	Ave. delay	Total delay	Ave. saved	Total saved
		sec	hrs	sec	hrs
2015	3683	207	212	0	0
2016	3796	207	218	0	0
2017	3909	207	225	0	0
2018	4229	209	246	-2	-2
2019	4549	211	267	-4	-5
2020	4869	213	288	-6	-8
2021	5189	215	310	-8	-12
2022	5509	217	332	-10	-15
2023	5829	219	355	-12	-19
2024	6149	221	377	-14	-24
2025	6469	223	401	-16	-29
2026	6788	226	426	-19	-36
2027	7107	228	450	-21	-41
2028	7426	230	474	-23	-47
2029	7745	232	499	-25	-54
2030	8064	234	524	-27	-60
2031	8383	236	550	-29	-68
2032	8702	238	575	-31	-75
2033	9021	240	601	-33	-83
2034	9340	242	628	-35	-91
2035	9659	244	655	-37	-99
2036	9978	246	682	-39	-108
2037	10297	248	709	-41	-117
2038	10616	250	737	-43	-127
2039	10935	252	765	-45	-137
2040	11254	254	794	-47	-147
2041	11573	256	823	-49	-158
2042	11892	258	852	-51	-168
2043	12211	260	882	-53	-180
2044	12530	262	912	-55	-191
2045	12849	264	942	-57	-203
2046	13168	266	973	-59	-216
2047	13487	268	1004	-61	-229
2048	13806	270	1035	-63	-242
2049	14125	272	1067	-65	-255
2050	14444	274	1099	-67	-269
2051	14763	276	1132	-69	-283
2052	15082	278	1165	-71	-297
2053	15401	280	1198	-73	-312
2054	15720	282	1231	-75	-328
2055	16039	284	1265	-77	-343
2056	16358	286	1300	-79	-359

Appendix L – Net present value and benefits cost ratio (do nothing)

Year	DR	DF	Benefits	PV Benefits	Cum Ben	1C Hrs	5C Hrs	BCR
2010		1.00						
2011	3.50%	1.04						
2012	3.50%	1.07						
2013	3.50%	1.11						
2014	3.50%	1.15						
2015	3.50%	1.19						
2016	3.50%	1.23	-5.59	-4.55				
2017	3.50%	1.27	0.00	0.00	-4.55	0	0	0.0
2018	3.50%	1.32	-0.02	-0.01	-4.56	-7	-9	0.0
2019	3.50%	1.36	-0.04	-0.03	-4.59	-15	-20	0.0
2020	3.50%	1.41	-0.06	-0.04	-4.63	-24	-32	0.0
2021	3.50%	1.46	-0.09	-0.06	-4.69	-35	-46	0.0
2022	3.50%	1.51	-0.12	-0.08	-4.77	-46	-61	0.0
2023	3.50%	1.56	-0.15	-0.10	-4.87	-58	-78	-0.1
2024	3.50%	1.62	-0.19	-0.12	-4.98	-72	-96	-0.1
2025	3.50%	1.68	-0.23	-0.14	-5.12	-86	-115	-0.1
2026	3.50%	1.73	-0.25	-0.14	-5.27	-96	-126	-0.2
2027	3.50%	1.79	-0.30	-0.17	-5.44	-113	-148	-0.2
2028	3.50%	1.86	-0.36	-0.19	-5.63	-130	-171	-0.2
2029	3.50%	1.92	-0.42	-0.22	-5.84	-148	-196	-0.3
2030	3.50%	1.99	-0.48	-0.24	-6.08	-168	-222	-0.3
2031	3.50%	2.06	-0.55	-0.27	-6.35	-189	-249	-0.4
2032	3.50%	2.13	-0.63	-0.30	-6.65	-210	-278	-0.5
2033	3.50%	2.21	-0.71	-0.32	-6.97	-233	-308	-0.5
2034	3.50%	2.28	-0.81	-0.35	-7.33	-257	-340	-0.6
2035	3.50%	2.36	-0.90	-0.38	-7.71	-282	-373	-0.7
2036	3.50%	2.45	-1.01	-0.41	-8.12	-308	-407	-0.8
2037	3.50%	2.53	-1.12	-0.44	-8.57	-335	-443	-0.9
2038	3.50%	2.62	-1.24	-0.47	-9.04	-363	-481	-1.0
2039	3.50%	2.71	-1.37	-0.51	-9.55	-392	-519	-1.1
2040	3.50%	2.81	-1.51	-0.54	-10.09	-422	-560	-1.2
2041	3.50%	2.91	-1.66	-0.57	-10.66	-453	-601	-1.3
2042	3.50%	3.01	-1.82	-0.60	-11.26	-486	-644	-1.5
2043	3.50%	3.11	-1.98	-0.64	-11.90	-519	-689	-1.6
2044	3.50%	3.22	-2.16	-0.67	-12.57	-553	-734	-1.8
2045	3.50%	3.33	-2.35	-0.71	-13.28	-589	-782	-1.9
2046	3.50%	3.45	-2.55	-0.74	-14.02	-625	-830	-2.1
2047	3.50%	3.57	-2.77	-0.78	-14.79	-663	-880	-2.3
2048	3.50%	3.70	-2.99	-0.81	-15.60	-702	-932	-2.4
2049	3.50%	3.83	-3.23	-0.85	-16.45	-742	-985	-2.6
2050	3.50%	3.96	-3.49	-0.88	-17.33	-782	-1039	-2.8
2051	3.50%	4.10	-3.75	-0.91	-18.24	-824	-1095	-3.0
2052	3.50%	4.24	-4.03	-0.95	-19.19	-867	-1152	-3.2
2053	3.50%	4.39	-4.32	-0.98	-20.17	-911	-1211	-3.4
2054	3.50%	4.54	-4.63	-1.02	-21.19	-956	-1271	-3.7
2055	3.50%	4.70	-4.96	-1.05	-22.25	-1002	-1332	-3.9
2056	3.50%	4.87	-5.30	-1.09	-23.34	-1050	-1395	-4.1

Appendix M – Net present value and benefits cost ratio (do something)

Year	DR	DF	Benefits	PV Benefits	Cum Ben	5C Hrs	3C Hrs	BCR
2010		1.00						
2011	3.50%	1.04						
2012	3.50%	1.07						
2013	3.50%	1.11						
2014	3.50%	1.15						
2015	3.50%	1.19						
2016	3.50%	1.23	-5.59	-4.55				
2017	3.50%	1.27	0.00	0.00	-4.55	0	0	0.0
2018	3.50%	1.32	0.05	0.04	-4.51	-9	-2	0.0
2019	3.50%	1.36	0.11	0.08	-4.43	-20	-5	0.0
2020	3.50%	1.41	0.18	0.13	-4.30	-32	-8	0.1
2021	3.50%	1.46	0.26	0.18	-4.12	-46	-12	0.1
2022	3.50%	1.51	0.35	0.23	-3.89	-61	-15	0.1
2023	3.50%	1.56	0.46	0.29	-3.60	-78	-19	0.2
2024	3.50%	1.62	0.57	0.35	-3.24	-96	-24	0.3
2025	3.50%	1.68	0.70	0.42	-2.82	-115	-29	0.4
2026	3.50%	1.73	0.75	0.43	-2.39	-126	-36	0.5
2027	3.50%	1.79	0.90	0.50	-1.89	-148	-41	0.6
2028	3.50%	1.86	1.07	0.57	-1.32	-171	-47	0.7
2029	3.50%	1.92	1.25	0.65	-0.67	-196	-54	0.9
2030	3.50%	1.99	1.44	0.73	0.06	-222	-60	1.0
2031	3.50%	2.06	1.66	0.81	0.86	-249	-68	1.2
2032	3.50%	2.13	1.89	0.89	1.75	-278	-75	1.4
2033	3.50%	2.21	2.14	0.97	2.72	-308	-83	1.6
2034	3.50%	2.28	2.42	1.06	3.78	-340	-91	1.8
2035	3.50%	2.36	2.71	1.15	4.93	-373	-99	2.1
2036	3.50%	2.45	3.03	1.24	6.17	-407	-108	2.4
2037	3.50%	2.53	3.37	1.33	7.50	-443	-117	2.6
2038	3.50%	2.62	3.73	1.42	8.93	-481	-127	3.0
2039	3.50%	2.71	4.12	1.52	10.44	-519	-137	3.3
2040	3.50%	2.81	4.54	1.62	12.06	-560	-147	3.7
2041	3.50%	2.91	4.98	1.71	13.77	-601	-158	4.0
2042	3.50%	3.01	5.45	1.81	15.59	-644	-168	4.4
2043	3.50%	3.11	5.95	1.91	17.50	-689	-180	4.8
2044	3.50%	3.22	6.49	2.01	19.52	-734	-191	5.3
2045	3.50%	3.33	7.05	2.12	21.63	-782	-203	5.8
2046	3.50%	3.45	7.66	2.22	23.85	-830	-216	6.2
2047	3.50%	3.57	8.30	2.33	26.18	-880	-229	6.8
2048	3.50%	3.70	8.98	2.43	28.61	-932	-242	7.3
2049	3.50%	3.83	9.70	2.54	31.14	-985	-255	7.8
2050	3.50%	3.96	10.46	2.64	33.78	-1039	-269	8.4
2051	3.50%	4.10	11.24	2.74	36.53	-1095	-283	9.0
2052	3.50%	4.24	12.08	2.85	39.38	-1152	-297	9.7
2053	3.50%	4.39	12.96	2.95	42.33	-1211	-312	10.3
2054	3.50%	4.54	13.89	3.06	45.39	-1271	-328	11.0
2055	3.50%	4.70	14.87	3.16	48.55	-1332	-343	11.7
2056	3.50%	4.87	15.90	3.27	51.81	-1395	-359	12.4