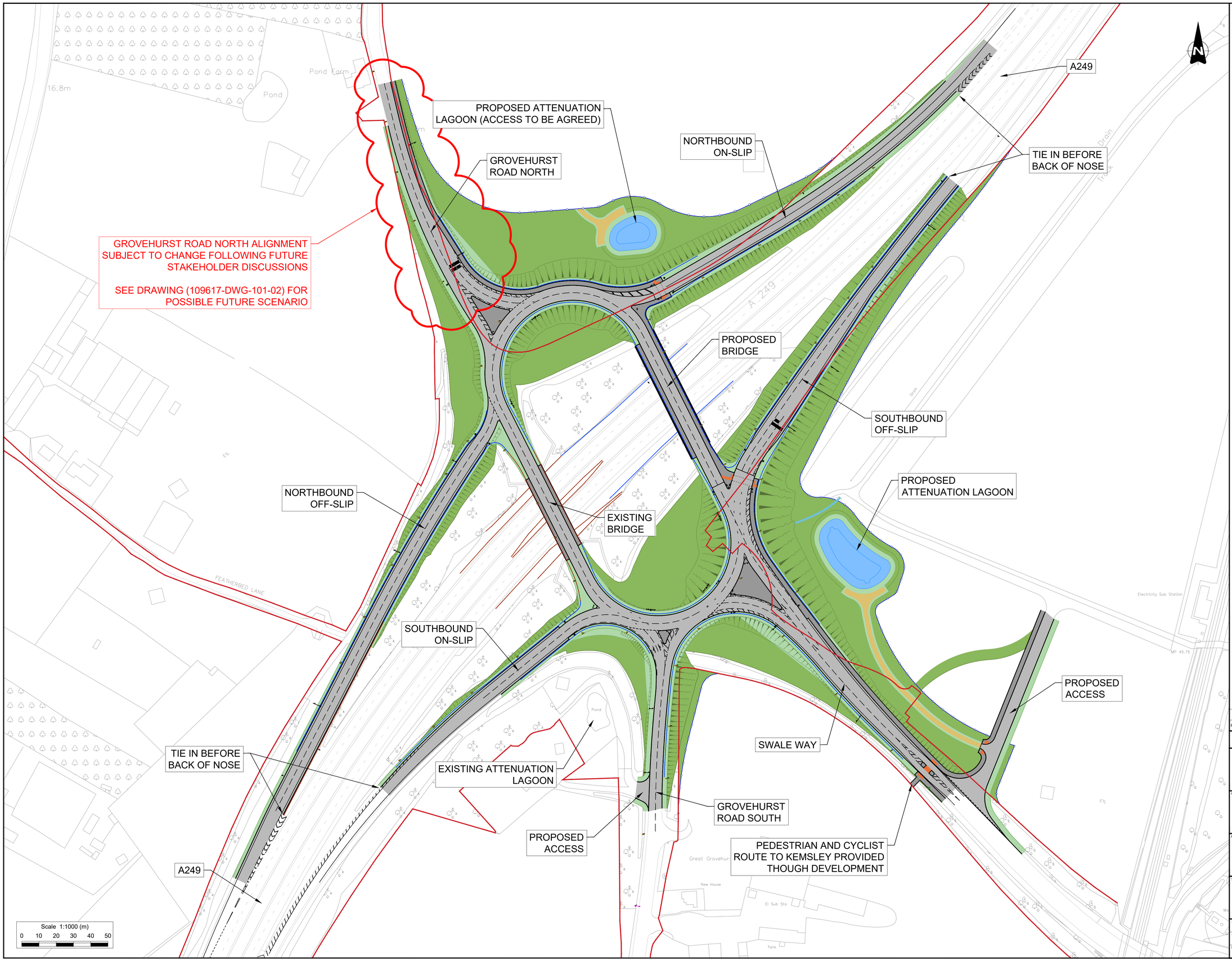

Notes:

1. Do not scale from this drawing. If in doubt refer to the project manager for clarification.
2. All dimensions are shown in metres unless otherwise stated.
3. Layout based on Ordnance Survey MasterMap, © Crown Copyright 2018. All rights reserved. Licence number 100022432.
4. This drawing forms part of a design pack and should be read in conjunction with all drawings listed on the project drawing register.

Key:

- OS
- Existing highway boundary
- Proposed kerb
- Proposed road marking
- Proposed footway
- Proposed verge / area kept clear for visibility
- Proposed green space / landscaping
- Proposed earthworks / embankments
- Proposed granular track
- Proposed attenuation pond
- Proposed tactile paving
- Proposed sign
- Proposed VRS / bridge parapet
- Proposed VRS / bridge parapet to remain
- Proposed fence / highway boundary
- Existing drainage ditch
- Proposed signal head

Rev	Date	Revision details	Drawn	Check.	Review	Approv
P0	03/06/2020	Initial Issue	DH	EH	DC	DC

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Client: **Kent County Council**

Project: **Grovehurst Outline Design**

Title: Proposed Layout
General Arrangement

Drawn	Checked	Reviewed	Approved
DH	EH	DC	DC

Original drg. size	Date	Scale	Drawing Status
A1	03-06-2020	1:1000	Preliminary

Drawing Number: 109617-dwg-101-01 Rev. P0

SWALE HIF – A249 Grovehurst Road Junction

2031 &2037 Traffic flows and Junction Operation

19th June 2020

Introduction

- **In this presentation, SYSTRA have assessed new designs for the Grovehurst Dumbbell Junction with the A249 slip roads.**

- **Future year flows for 2037 have been derived from 2031 flows compiled by PBA and with growth up to 2037 added using TEMPro.**

- **The 2031 PBA flows were derived from 2015 observed data using TEMPro and development trip rates generated using TRICS.**

- **This document will outline the 2031 flows, the 2037 flows used for assessment, the current design iteration, and initial modelling outputs.**

2031 Flows

- **2031 flows have been supplied to SYSTRA for use within the assessment of improvements at Grovehurst Junction.**
- **These flows include background growth and all development traffic expected by 2031.**

2031 Flows

Total Vehicles

AM		Destination							
		A249 N	A249 N Mainline	Swale Way	Grovehurst Road S	A249 S	A249 S Mainline	Grovehurst Road N	Tot.
Origin	A249 N	0		424	273	1	1361	4	**702**
	Swale Way	149		3	115	347		95	**709**
	Grovehurst Road S	233		216	12	290		150	**901**
	A249 S	0	1039	593	285	0		121	**999**
	Grovehurst Road N	36		327	157	298		3	**821**
	Tot.	**418**		**1563**	**842**	**936**		**373**	**4132**

PM		Destination							
		A249 N	A249 N Mainline	Swale Way	Grovehurst Road S	A249 S	A249 S Mainline	Grovehurst Road N	Tot.
Origin	A249 N	0		215	275	0	1094	45	**535**
	Swale Way	306		3	205	587		178	**1279**
	Grovehurst Road S	289		138	9	151		169	**756**
	A249 S	1	1661	355	380	0		322	**1058**
	Grovehurst Road N	62		114	123	116		1	**416**
	Tot.	**658**		**825**	**992**	**854**		**715**	**4044**

TEMPro Factored 2031 Flows to 2037

- **The 2031 PBA flows have been factored up to 2037 using TEMPro.**
- **A factor of 1.0402 has been used for AM Peak, and 1.0413 has been used for PM Peak.**

2037 Flows

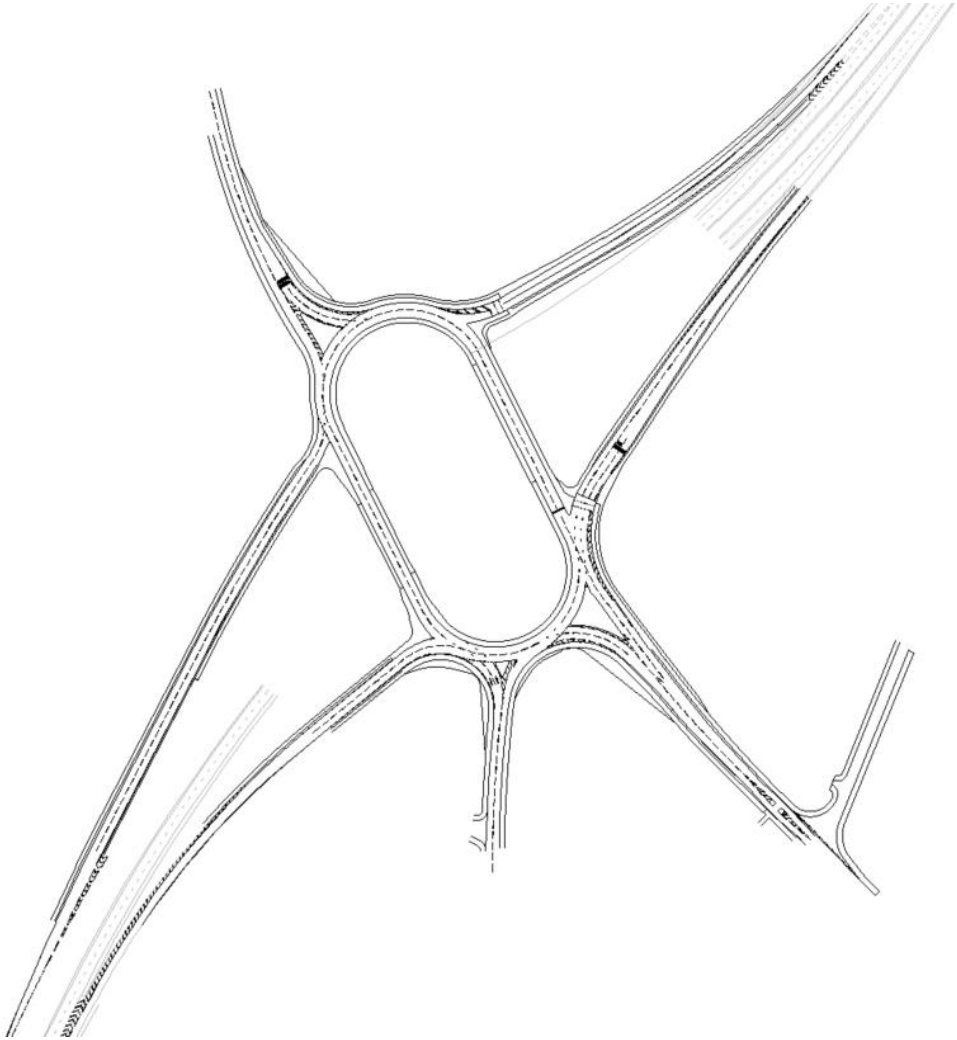
Total Vehicles

AM		Destination							
		A249 N	A249 N Mainline	Swale Way	Grovehurst Road S	A249 S	A249 S Mainline	Grovehurst Road N	Tot.
Origin	A249 N	0		441	284	1	1416	4	**730**
	Swale Way	154		3	120	361		99	**738**
	Grovehurst Road S	242		225	12	302		156	**937**
	A249 S	0	1081	617	296	0		126	**1039**
	Grovehurst Road N	37		340	163	310		3	**854**
	Tot.	**434**		**1626**	**876**	**974**		**388**	**4298**

PM		Destination							
		A249 N	A249 N Mainline	Swale Way	Grovehurst Road S	A249 S	A249 S Mainline	Grovehurst Road N	Tot.
Origin	A249 N	0		224	286	0	1139	47	**557**
	Swale Way	318		3	213	611		186	**1332**
	Grovehurst Road S	301		144	9	157		176	**787**
	A249 S	1	1730	370	396	0		335	**1102**
	Grovehurst Road N	65		119	128	121		1	**433**
	Tot.	**685**		**860**	**1032**	**889**		**744**	**4211**

SYSTRA

Grovehurst Junction Improvement Design



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Model Outputs

- The latest design has been assessed using the 2037 flows in VISSIM.
- The outputs have been compared against the 2018 Baseline to allow comparison against present-day operation.

AM Peak		
Throughput	Base	2037 Flows
Network Total	4449	6931

Journey Times (Seconds)	Base	2037 Flows
Total	2669.9	3334.69

Average Queue - Metres	Base	2037 Flows
Network Total	27.325	101.955

Queue Max - Metres	Base	2037 Flows
Network MAX	322.86	501.28

Average Delay Per Vehicle	Base	2037 Flows
Network Total	28.8	54.04

LOS	Base	2037 Flows
Network Total	C	C

PM Peak		
Throughput	Base	2037 Flows
Network Total	4486	6162

Journey Times (Seconds)	Base	2037 Flows
Total	2478.3	2748.82

Average Queue - Metres	Base	2037 Flows
Network Total	39.835	54.99

Queue Max - Metres	Base	2037 Flows
Network MAX	488.12	509.97

Average Delay Per Vehicle	Base	2037 Flows
Network Total	30.53	50.18

LOS	Base	2037 Flows
Network Total	C	C

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AM Outputs

- The AM peak experiences greater delay and queues than the base year as a result of the substantial increase in demand and the added signals.
- A249 SB Offslip experiences a lower LOS and greater delay as a result of the signals which prioritise the circulatory movement, although it should be noted that the queue on the slip is well within stacking capacity.
- Swale Way and Grovehurst NB both experience higher levels of queueing and delay as a result of the high throughput and lack of gaps to enter the gyratory.

	Demand	Q	Max Q	Delay	LOS
A249 SB Offslip	731	30.63	116.57	38.95	D
Swale Way	711	154.75	437.31	43.46	E
Grovehurst NB	869	300.27	501.28	52.89	F
A249 NB Offslip	1035	15.67	93.12	21.01	C
Grovehurst SB	851	13.68	78.73	19.89	B

PM Outputs

- The PM peak generally experiences smaller increases in delay and queues compared to the base as the AM peak does.
- Only Swale Way experiences significant queueing and delays in the PM peak, again as a result of the high throughput and lack of gaps in traffic to enter the gyratory.
- The max queues on both slips remain well within stacking capacity with no threat of tailing back onto the mainline.

	Demand	Q	Max Q	Delay	LOS
A249 SB Offslip	561	10.36	62.11	19.69	B
Swale Way	941	398.99	509.97	43.39	E
Grovehurst NB	789	19.29	204.71	24.66	C
A249 NB Offslip	1101	22.07	112.49	22.07	C
Grovehurst SB	430	4.28	38.3	14.16	B

Summary

- **The current design is expected to experience some additional delay and queueing compared with the base in 2037 with the additional traffic demand.**

- **Whilst the added traffic signals will improve capacity of the junction as a whole, they do increase delay and queueing for some movements.**

- **SYSTRA/KCC are continuing to develop the proposed A249 Grovehurst Road Junction design to ensure the design provides overall improvement compared to the base year scenario.**

Key Street Roundabout
Full Design

2017 Base Year Flows		AM		PM	
Arm	**Lane**	**DoS**	**MMQ (PCUs)**	**DoS**	**MMQ (PCUs)**
Circulatory South	Nearside	45%	2.9	52%	3.5
	Middle	57%	4.3	62%	4.6
	Offisde	57%	-	62%	-
A249 NB Offslip	Nearside	52%	-	54%	-
	Offisde	56%	2.8	59%	3.6
Network Results		**PRC**	**Delay (pcuHr)**	**PRC**	**Delay (pcuHr)**
		36%	10.47	33%	11.25

2035 Future Year Flows		AM		PM	
Arm	**Lane**	**DoS**	**MMQ (PCUs)**	**DoS**	**MMQ (PCUs)**
Circulatory South	Nearside	52%	3.5	60%	4.3
	Middle	68%	5.9	68%	5.7
	Offisde	68%	-	68%	-
A249 NB Offslip	Nearside	63%	-	73%	-
	Offisde	65%	3.6	77%	5.2
Network Results		**PRC**	**Delay (pcuHr)**	**PRC**	**Delay (pcuHr)**
		6%	15.9	8%	16.49

2037 Future Year Flows		AM		PM	
Arm	**Lane**	**DoS**	**MMQ (PCUs)**	**DoS**	**MMQ (PCUs)**
Circulatory South	Nearside	53%	3.5	60%	4.4
	Middle	70%	6.1	69%	5.9
	Offisde	70%	-	69%	-
A249 NB Offslip	Nearside	65%	-	75%	-
	Offisde	65%	3.6	78%	5.3
Network Results		**PRC**	**Delay (pcuHr)**	**PRC**	**Delay (pcuHr)**
		5%	16.69	7%	16.68