



Defra
Research Contract: Reservoir Safety Advice

**ENGINEERING GUIDE TO EMERGENCY
PLANNING FOR UK RESERVOIRS**

**Volume 3 of 3 : Main Guide
Completed examples – A3
Draft for informal consultation**

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VOLUME PLAN

Volume

1 Main Guide

Main Guide

Appendix A : Emergency Planning generally

Appendix B : Detailed issues regarding hydraulic modelling

Appendix C : Scenario Planning in relation to possible emergencies at a dam

Appendix D : Possible template for off-site plan

2 Completed examples - A4

Appendix E : Rapid Impact assessment

Appendix F.1 : Standard Impact assessment (A4 plan)

Appendix G : On-site Plan Example A (owner of single dam)

Appendix H : On-site Plan Example B (owner of many dams)

Appendix J : External Interface Plan

Appendix K : Statement by Qualified Civil Engineer

3 Completed examples- A3

Appendix F.2 : Standard Impact assessment (A3 maps and tables)

The authors of this report are employed by Jacobs Babbie. The work reported herein was carried out under a Contract placed on 6th September 2002 by the Secretary of State for the Environment, Food and Rural Affairs.

Any views expressed are not necessarily those of the Secretary of State for the Environment, Food and Rural Affairs.

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**APPENDIX F.2 : EXAMPLE OF
STANDARD IMPACT ASSESSMENT
VOLUME 2 (ATTACHMENT B - A3):
RESULTS FOR RIVER ARIES**

**STANDARD IMPACT ASSESSMENT
for reservoirs owned by Xenon plc on
Rivers Anduin, Aries and Kappa**

Preface

1. This example Impact assessment, although based on a real cascade, has been edited in respect of key features of the cascade and downstream valley to preserve the anonymity of the dam, including names.

Volume Plan

Volume		Title
1	Main report	Standard Impact assessment for reservoirs owned by Xenon plc on Rivers Anduin, Aries and Kappa
2	Attachment B	Results for River Anduin
3	Attachment C	Results for River Aries
4	Attachment D	Results for River Kappa

Notes. 1. Volumes 2 and 3 not included with Guide to Emergency Planning for brevity

Change log for plan

Rev	Date	Details of nature of change	By	Ckd	Approved		Accepted by EA
					Owner	Panel AR ¹	
A01.01	17/06/2005	Issued to Environment Agency for examination and acceptance	FJBS	AJB	EHG	JDG	Na
A01.02	15/08/2005	Accepted by Environment Agency	-	-	-	-	ABC
A02.01	2/3/20012	Add new housing estate to consequence tables	RTS	SEG	EHG	JDG	GTF

Notes

1. Documented in signed off separate statement by Qualified Civil Engineer

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Relevant extracts of Environment Agency Zone 2 and 3 maps (from internet)
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PHOTOGRAPHS OF KEY POINTS CONTROLLING FLOW DOWN ANDUIN VALLEY

Motorway at CH xxx, from downstream (note car parked in left hand corner)



Bridge under Canal , from upstream



Railway at Ch 3600, from downstream



AX bridge, from downstream



RELEVANT EXTRACTS OF ENVIRONMENT AGENCY ZONE 2 AND 3 MAPS (FROM INTERNET)

Omitted to maintain anonymity of the reservoir

FIGURES

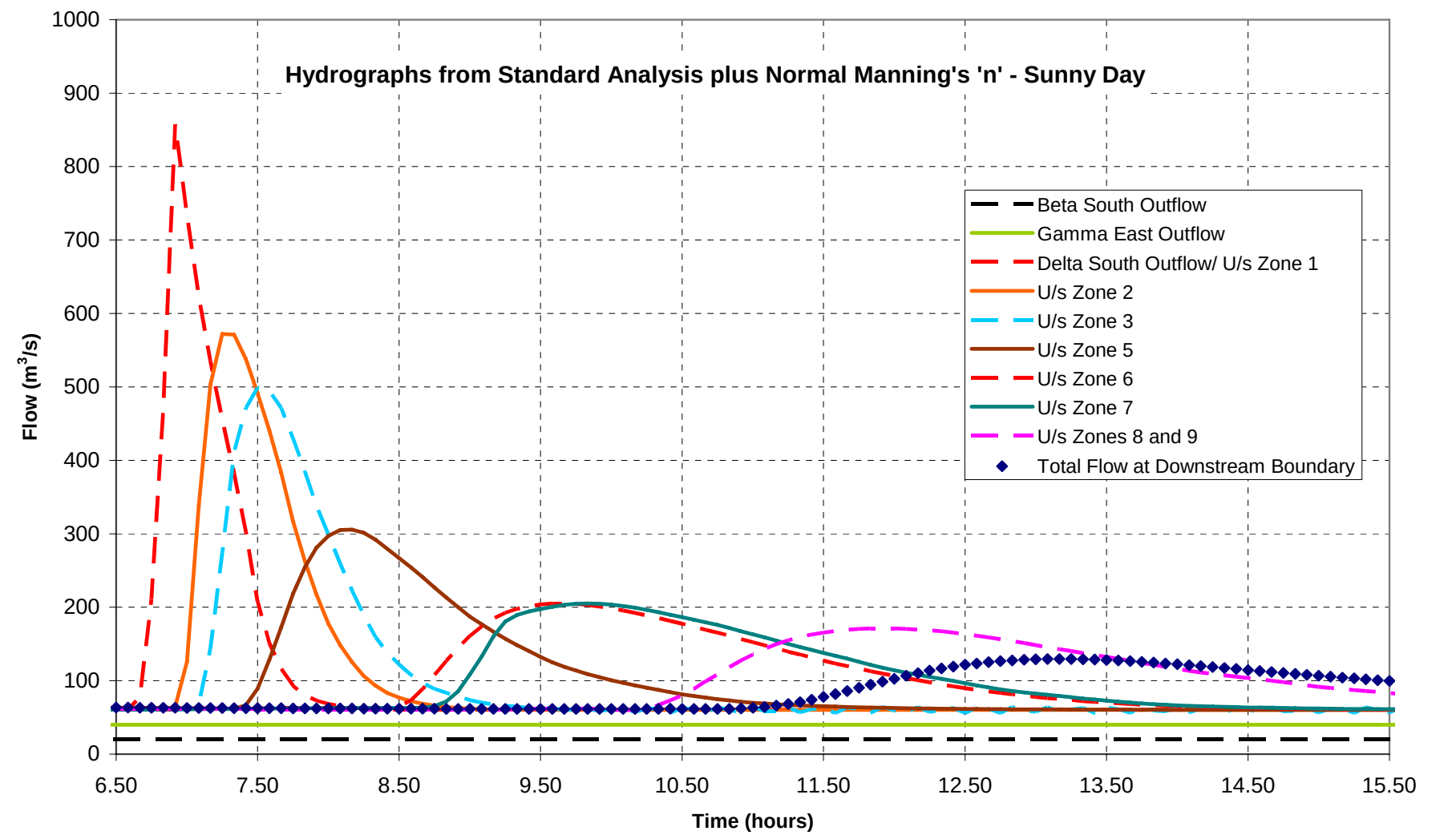


Figure B.1R : Anduin : Flood Hydrographs from Standard Analysis (Rainy day)

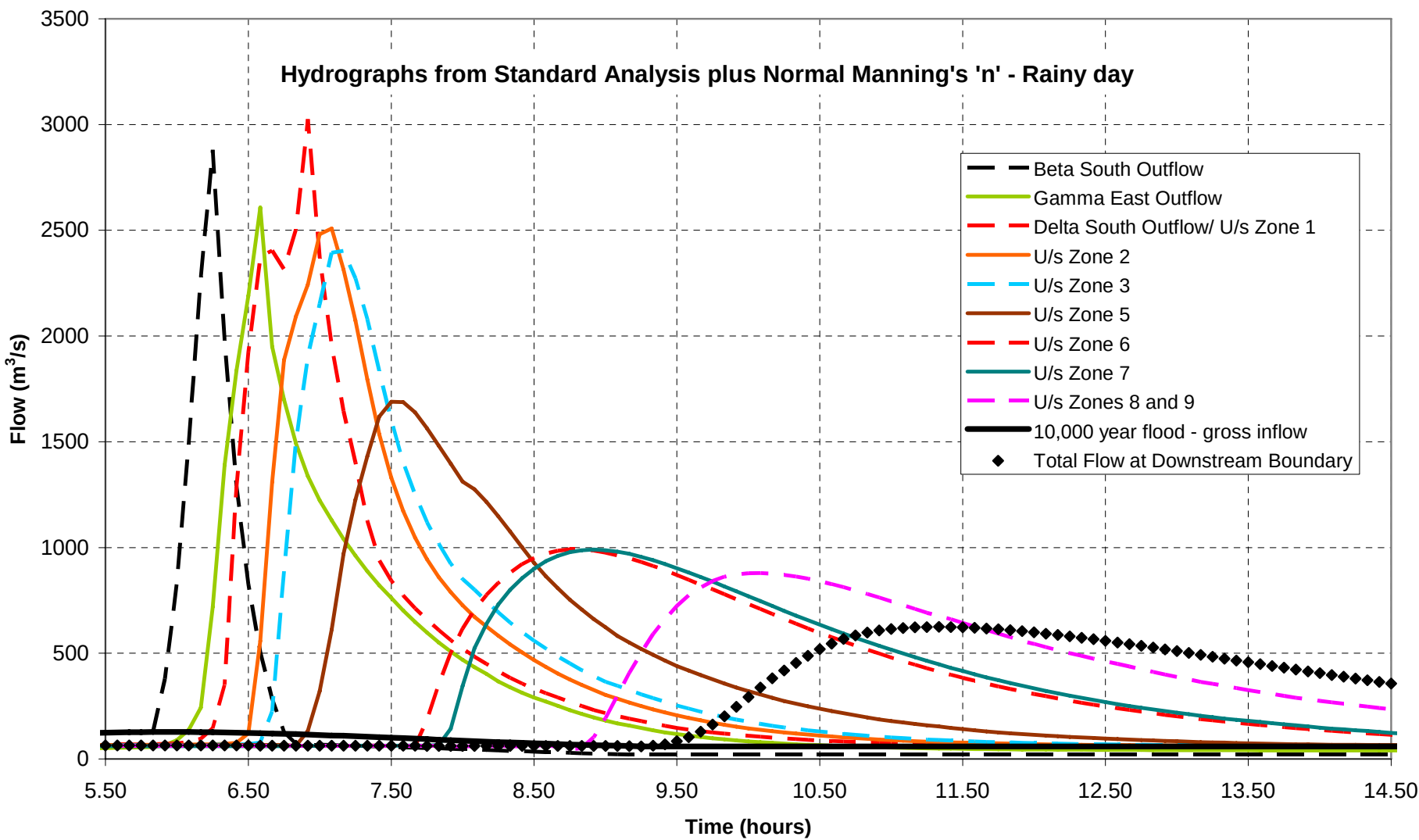


Figure B.1S : Anduin : Flood Hydrographs from Standard Analysis (Sunny day)

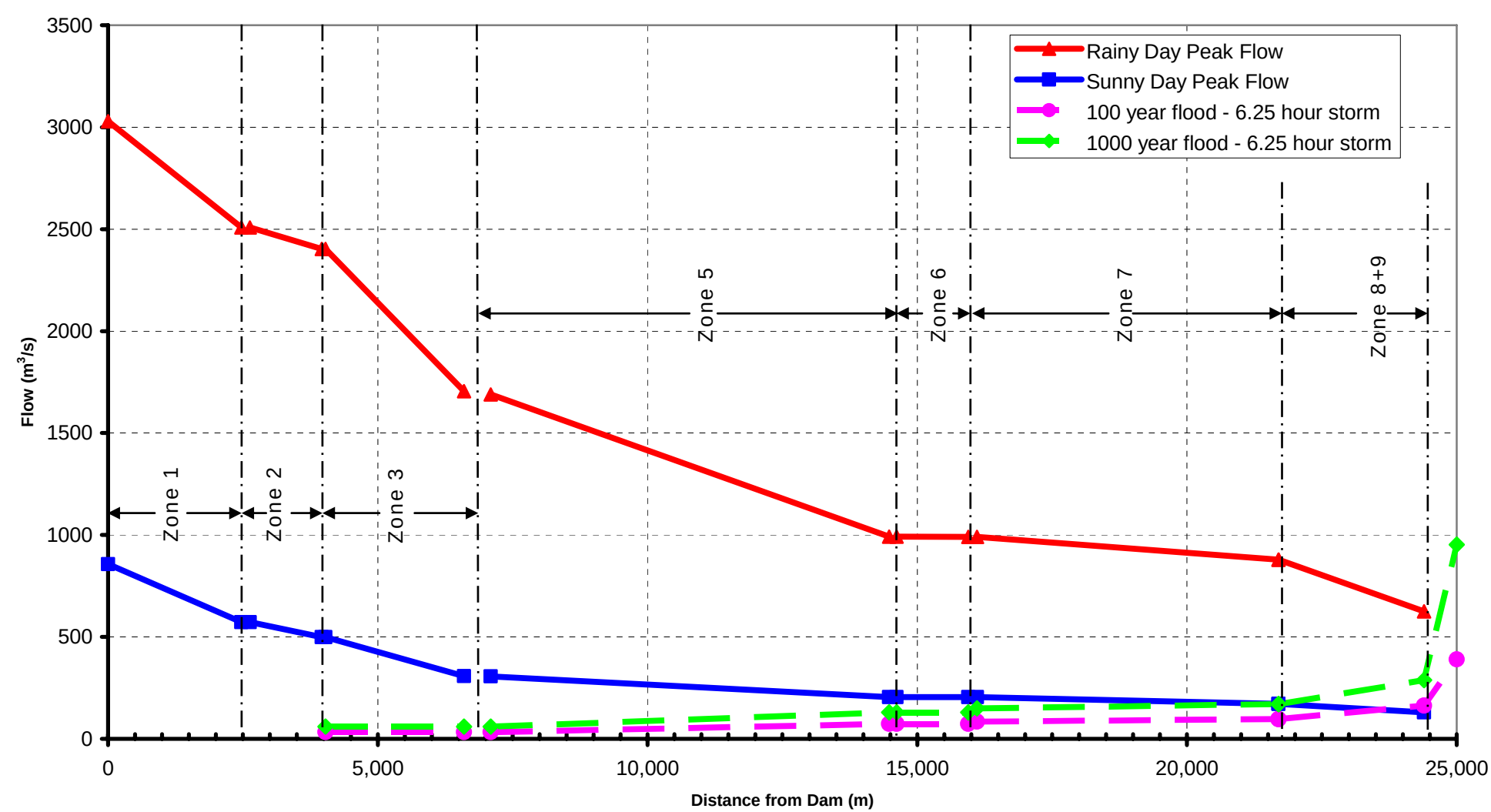
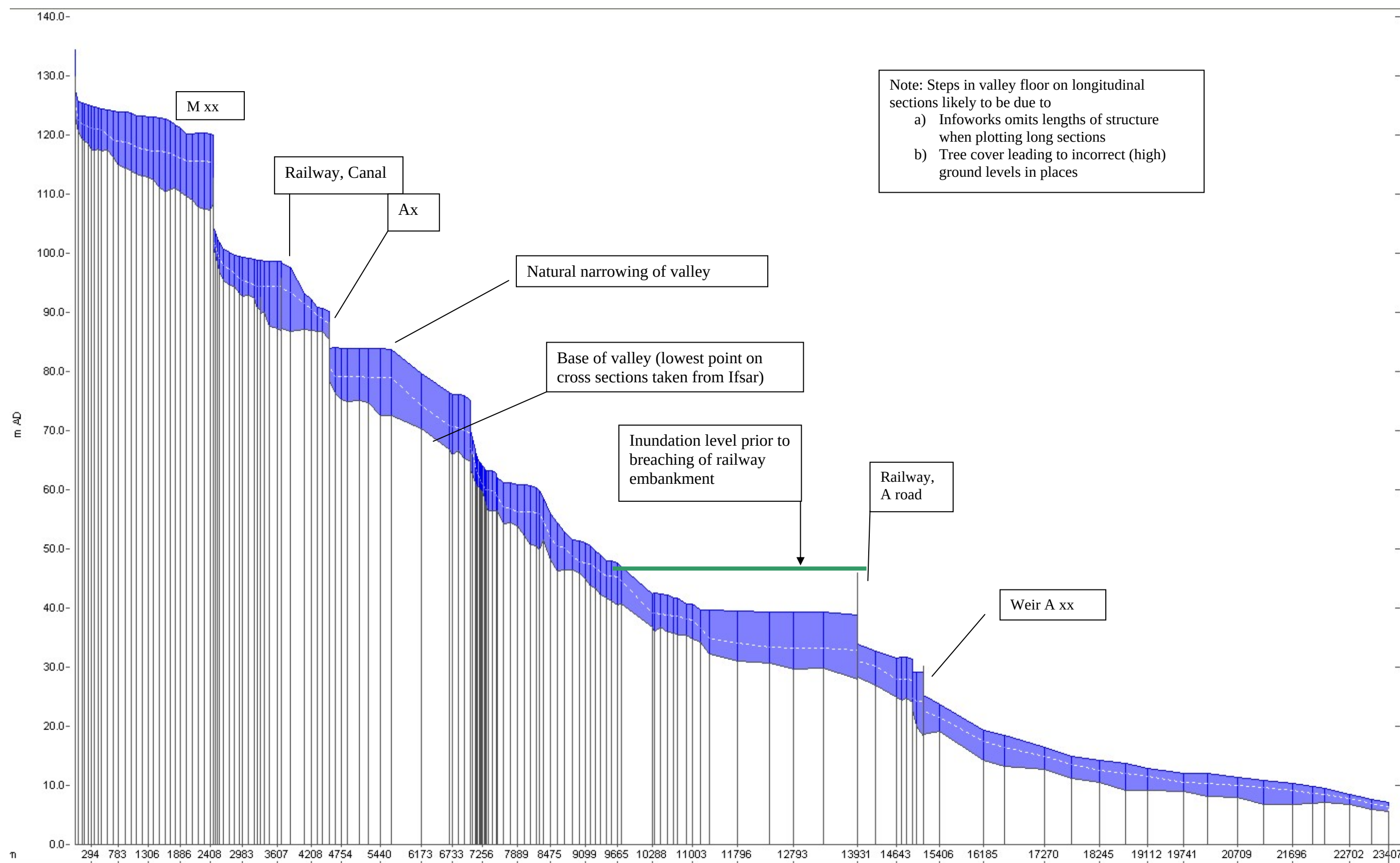


Figure B.2 : Anduin : Peak flows down valley

Figure B.3 : Anduin : Longitudinal section down valley showing peak flood levels



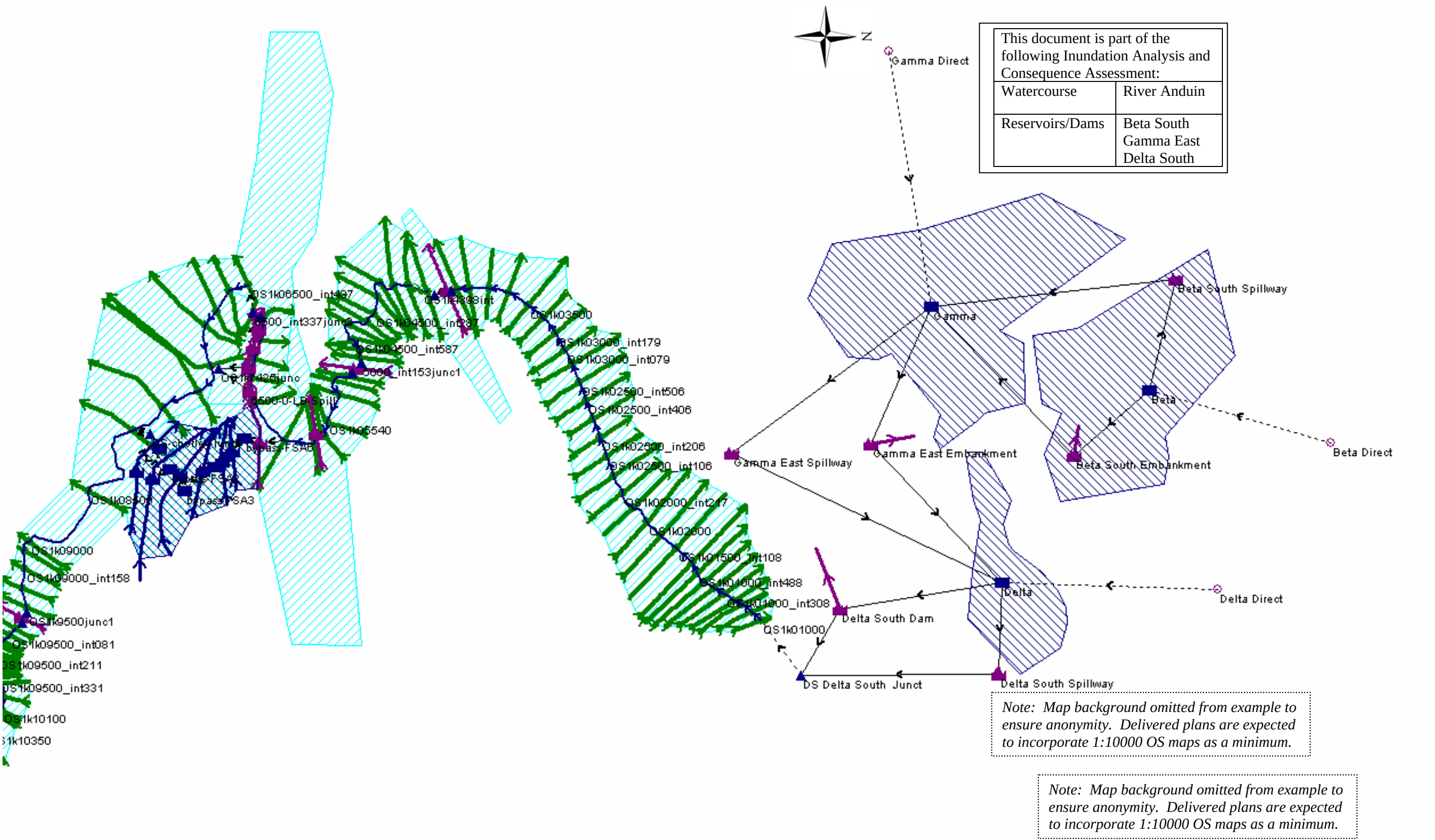


Figure B.4-1 : Anduin: Model Layout – Upstream section

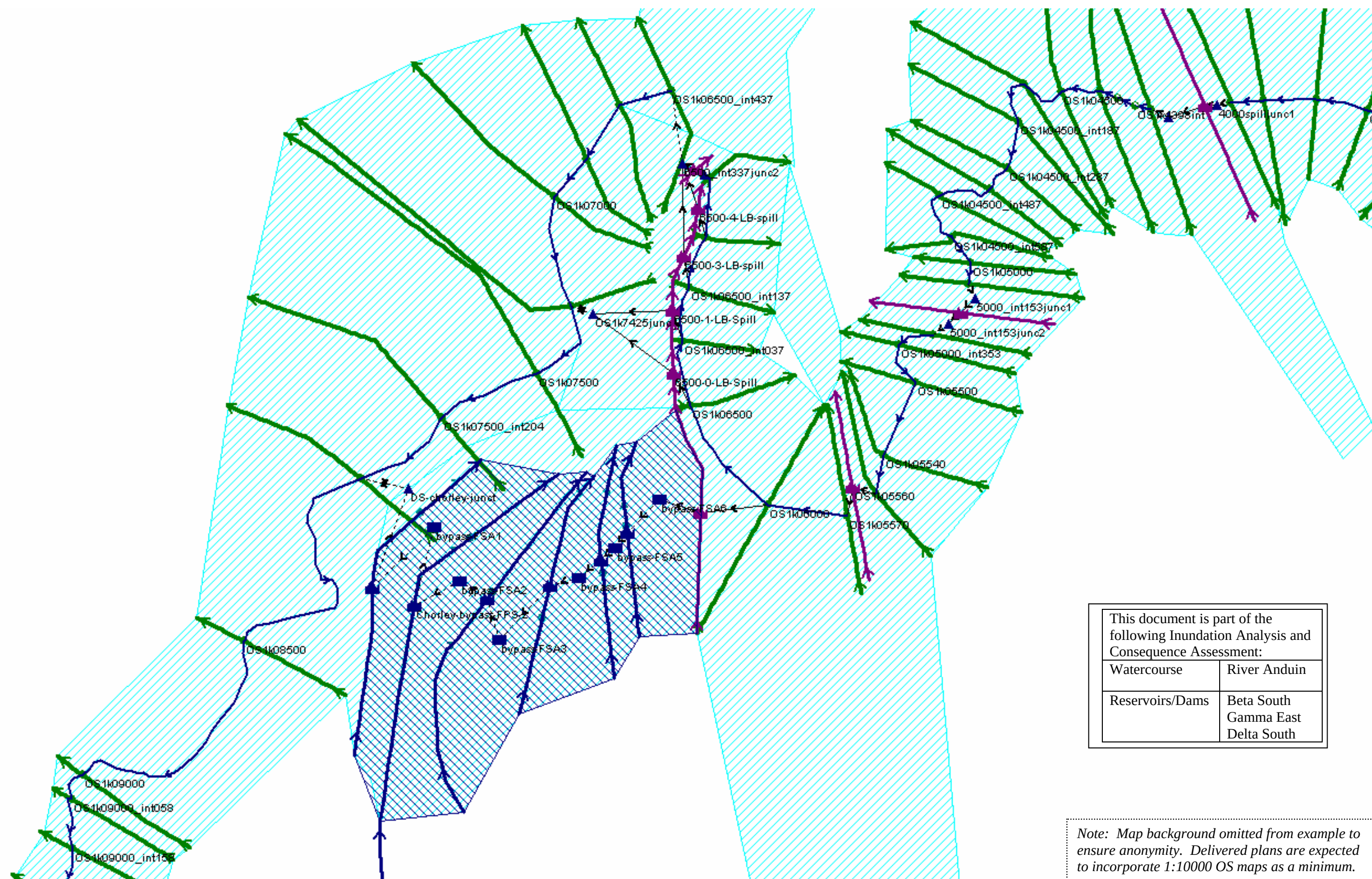


Figure B.4-2 : Anduin: Model Layout – Upstream section – Detail



Figure B.4-3 : Anduin: Model Layout – Middle section

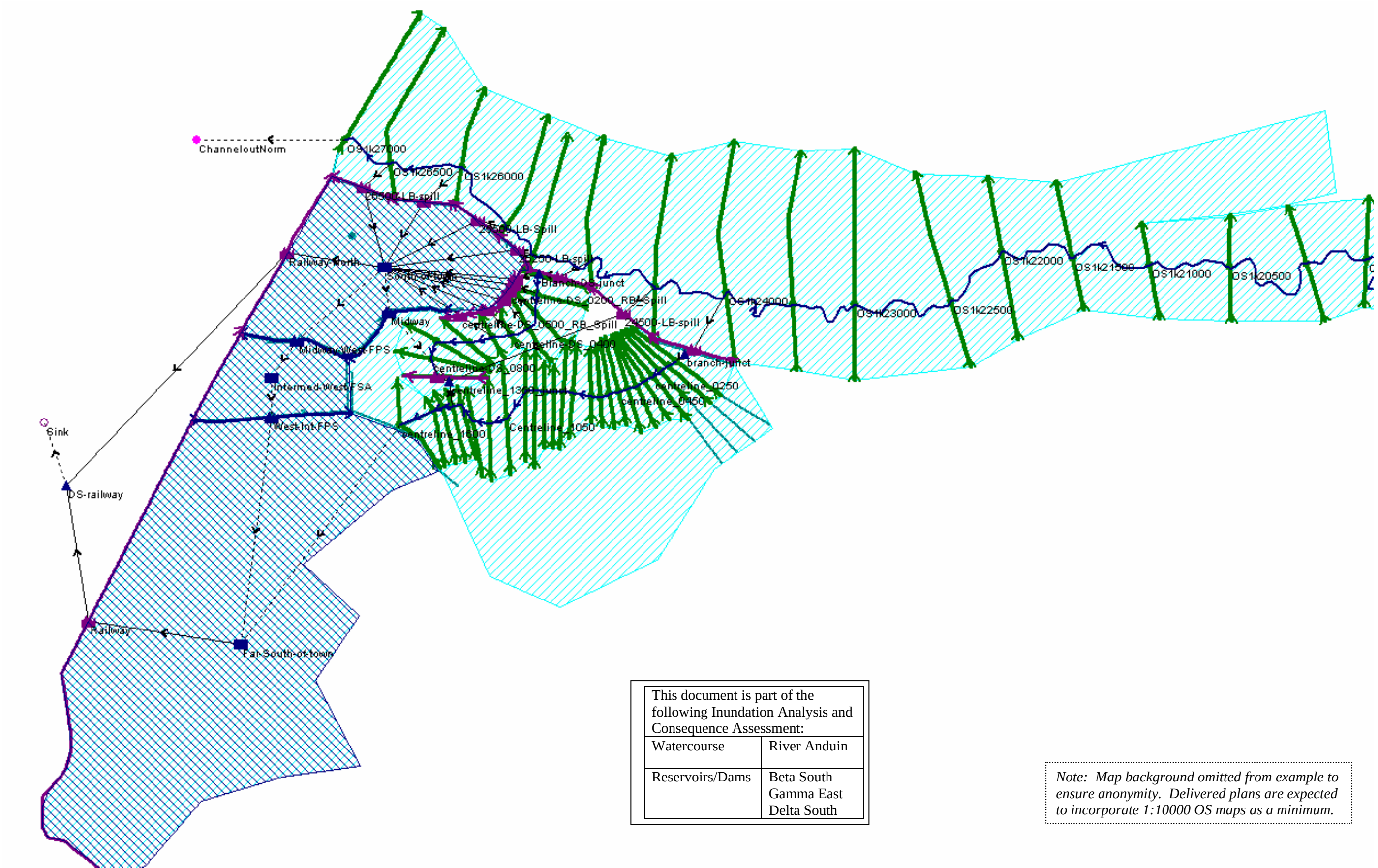
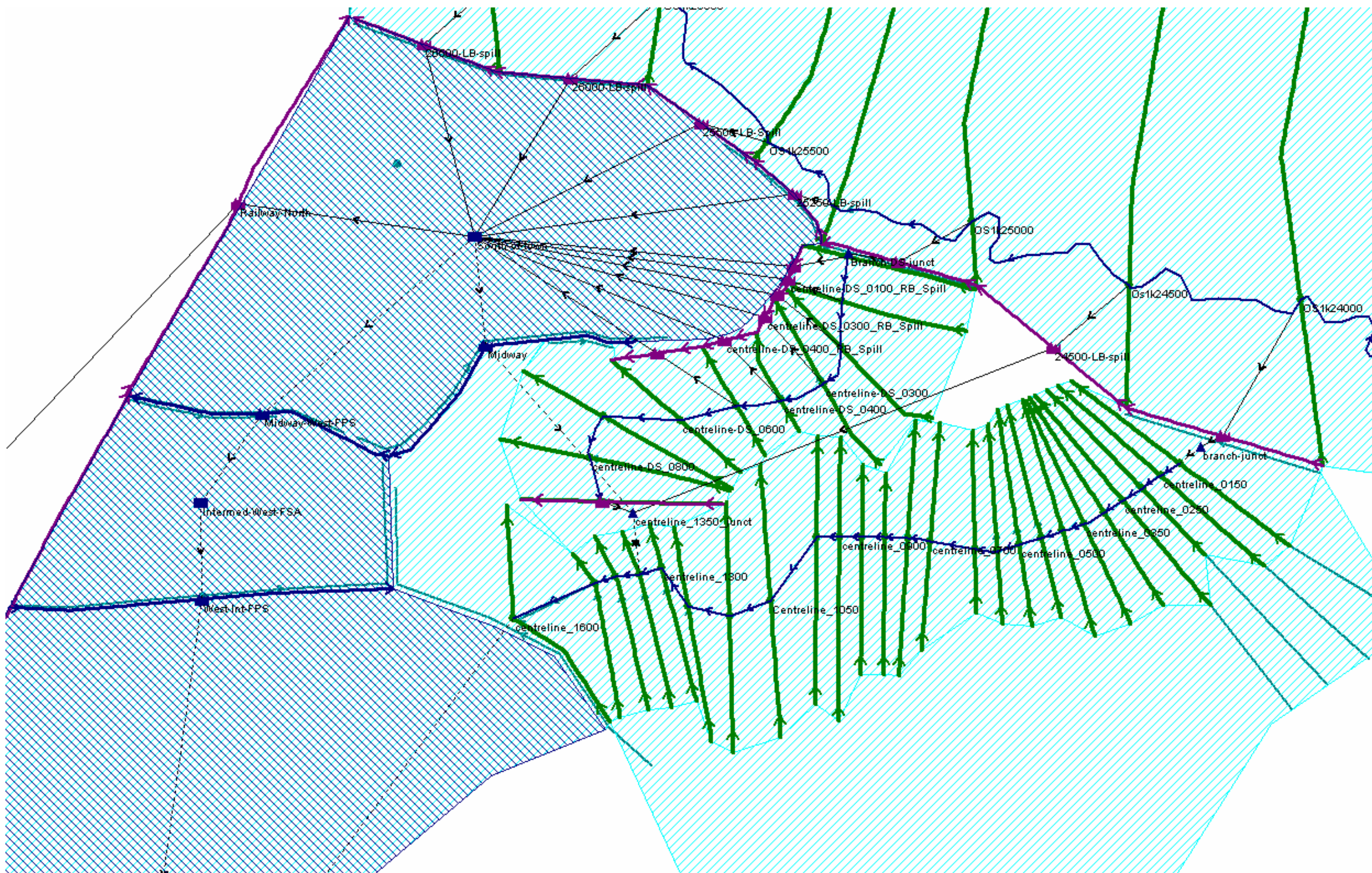


Figure B.4-4 : Anduin: Model Layout – Downstream section



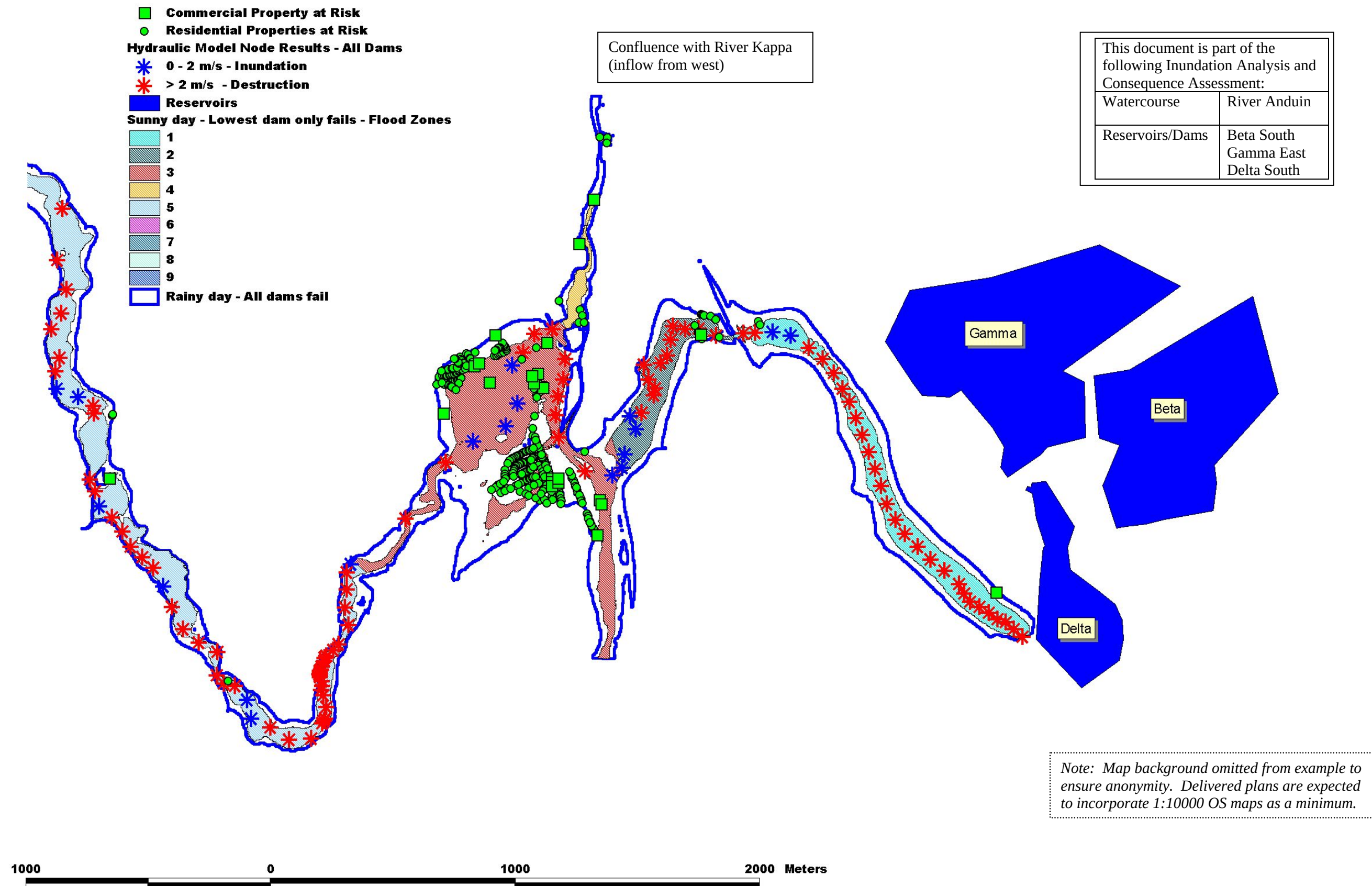


Figure B.5-1 : Anduin : Flood Risk Map without OS Mapping – Flood Zones 1, 2, 3, 4 and 5

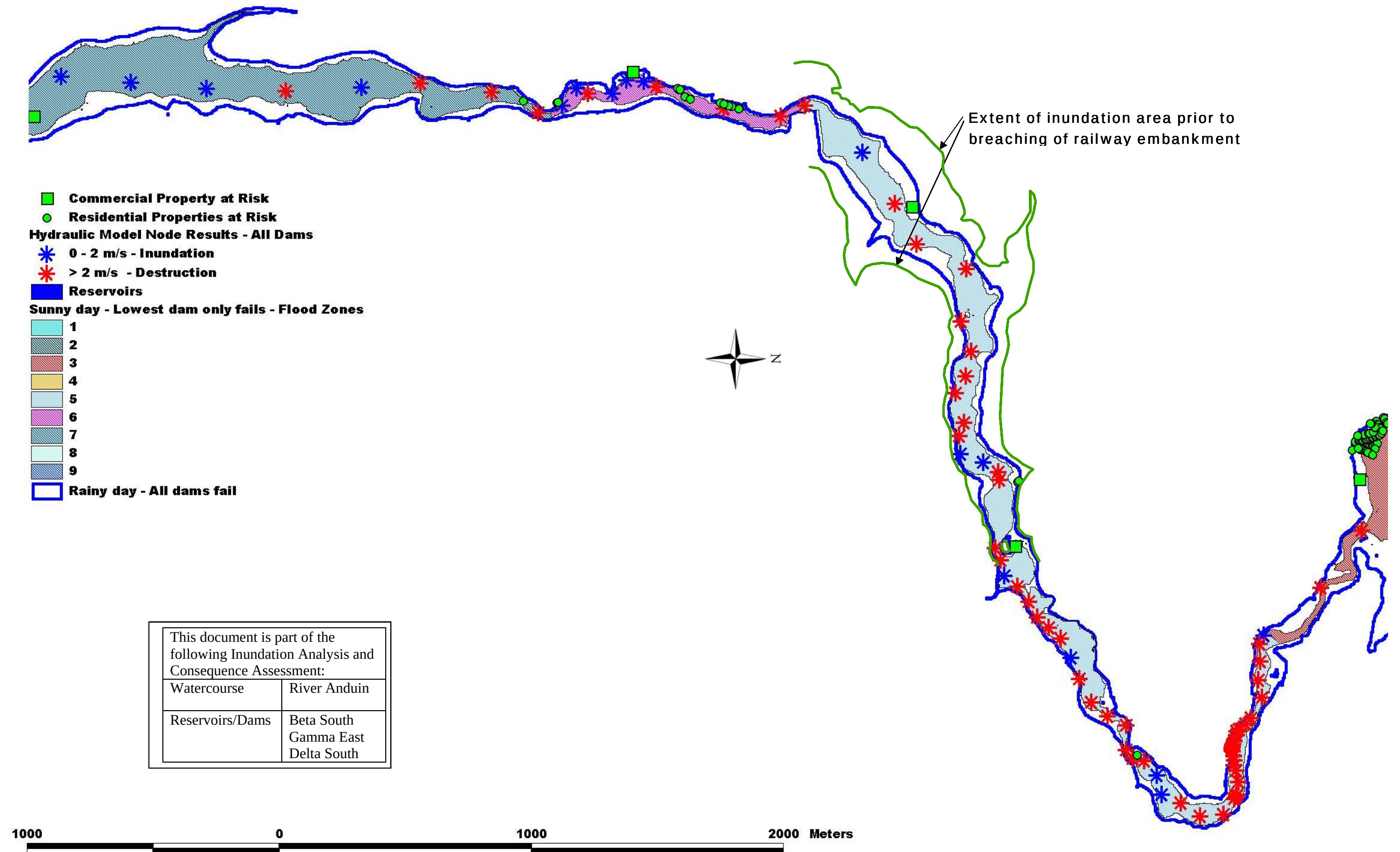


Figure B.5-2 : Anduin: Flood Risk Map without OS Mapping – Flood Zones 3, 4, 5, 6 and 7

Note: Map background omitted from example to ensure anonymity. Delivered plans are expected to incorporate 1:10000 OS maps as a minimum.

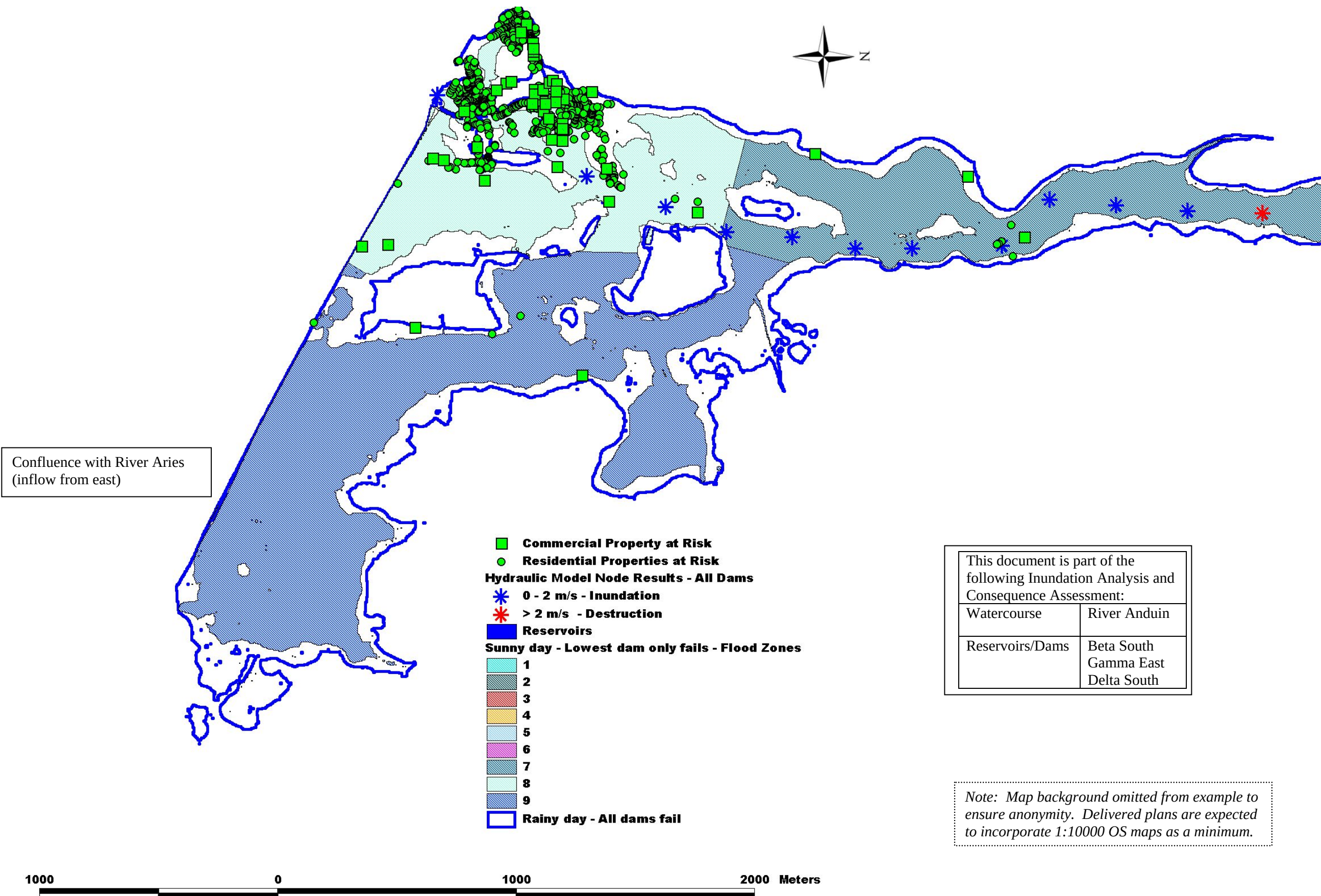


Figure B.5-3 : Anduin: Flood Risk Map without OS Mapping – Flood Zones 7, 8 and 9

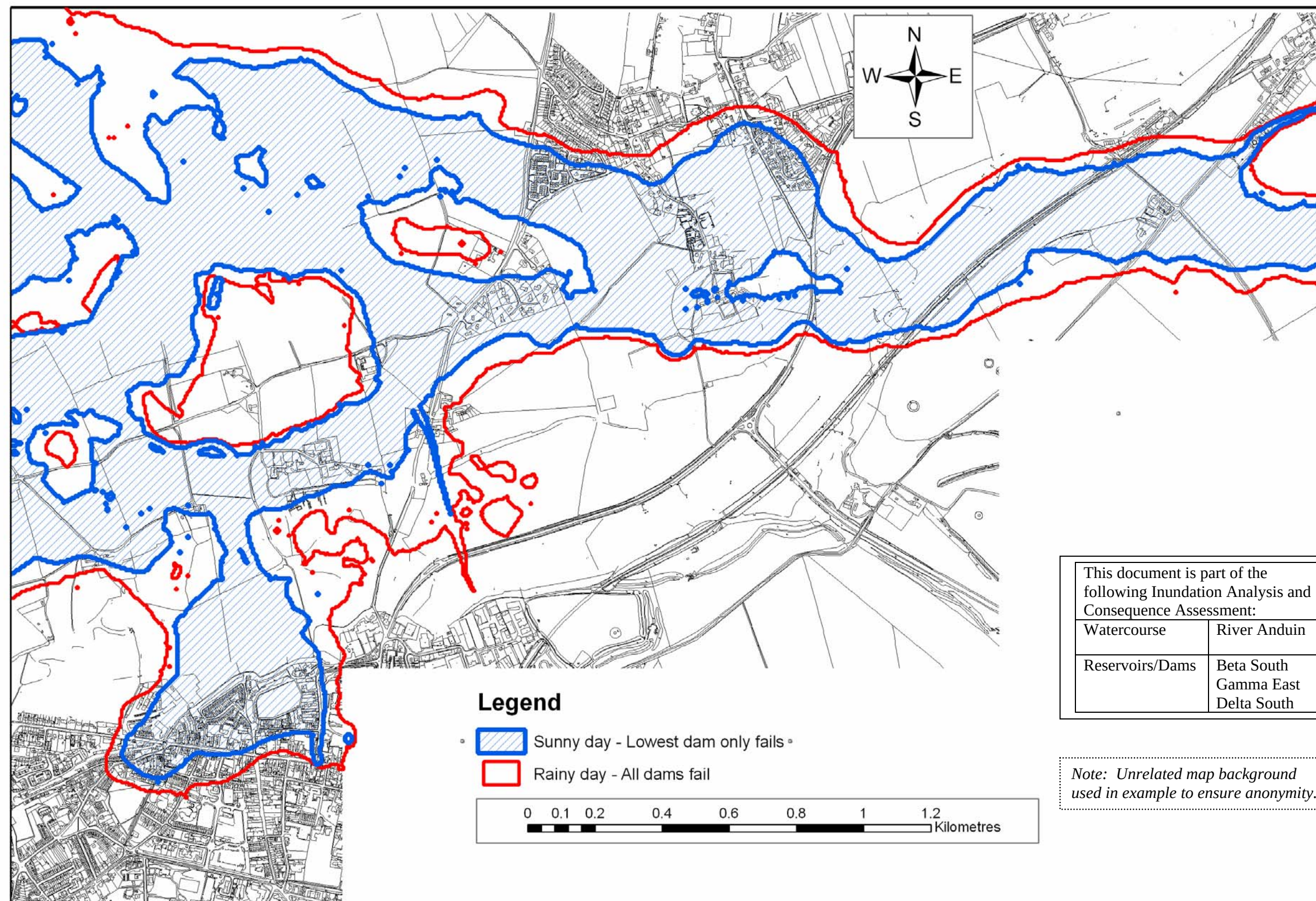


Figure B.6. 1 Inundation plan Sheet 8

Point definition						Embankment				Structure through embankment					All structures and embankments intact						Best estimate Representation								Notes						
Flood Zone Reference	Name of Transportation embankment	Model Cross Section Immediately Upstream	Easting	Northing	Floodplain Elevation	Crest Level	Max height	Crest width (along flow route)	Notes re vulnerability to breach	Type	Bottom Width	Height of crown above flood plain	Open area above flood plain (unrestricted)	Source of data	% blockage in dam break event	Effective open area above flood plain	Hydraulic model output -				Structure Representation				Hydraulic model output										
																	Maximum discharge	Maximum Average Velocity	Maximum Flood Elevation	Maximum Floodplain Depth	Status	Notch Invert	Bottom Width of Notch	Notch Width at embankment crest	Maximum discharge	Maximum Average Velocity	Maximum Flood Elevation	Maximum Floodplain Depth							
ZoneRef	PointName	PT_CS	XCoordPt	YCoordPt	GroundLevel												Qmax	MaxVel	MaxStage	MaxDepth					Qmax	MaxVel	MaxStage	MaxDepth							
Rainy day scenario																	See Note on front sheet of Volume 1																		
Zone 1	Mxx motorway bridge SE Pelargir. C road on right bank	OS1k03550			108.5	116.0	7.5	30	Low	Vertical RC side walls	20	15.0	300	Site visit	0	300	See Note on front sheet of Volume 1				Breached	108.5	10	70	2509	2.0	120.0	11.4	Ifsar data shows step in flood plain level - this is probably error, due to dense tree covering valley upstream of bridge						
Zone 2	Railway 1 - bridge SE Pelargir	OS1k05550			86.8	93.2	6.4	6	High	Masonry arch bridge	5	9	40	Site visit	50%	20	See Note on front sheet of Volume 1				Breached	87.2	0	60	2403	1.5	98.5	11.7							
Zone 3	Canal bridge over river SW of Railway 1	OS1k05570			87.4	91	3.6	10	Medium	Masonry arch bridge	6	3	15	Site visit	80%	3	See Note on front sheet of Volume 1				Embankment and structure not modelled				2403	1.9	98.2	10.8	Flood will also flow along canal route in both directions						
Zone 3	Ax road bridge at Pelargir	OS1k06500_int63			75.3	80	4.7	12	Medium	Masonry arch bridge	9	5	40	Site visit	50%	20	See Note on front sheet of Volume 1				Embankment and structure not modelled				1119	2.8	84.1	8.8	Flow reduced by shortcut spill route.						
Zone 5	Railway 2 - dual bridges near Euxton	OS1k17000			28.1	45.5	17.4	6	High	RC Culvert	10	4	40	Air photos; no public access	50%	20	See Note on front sheet of Volume 1				Breached	28.0	20	80	992	2.1	38.8	10.7							
										High Viaduct - would have no significant incremental effect on flow relative to upstream culvert											Embankment and structure not modelled				As Above										
Zone 6	Axx road - Pxxxxx Bridge	OS1k17400			28.3	39	10.7	10	Low	Masonry Arch bridge	10	10	100	Site visit	10%	90	See Note on front sheet of Volume 1				Embankment and structure not modelled				992	2.8	33.8	5.5							
Zone 6	Byway immediately downstream (original route)					Neglect as broadly at flood plain				masonry humpback	10	3	30	Site visit	80%	6	See Note on front sheet of Volume 1				Embankment and structure not modelled				As Above										
Zone 6	Ax motorway bridge. Gravel track under one side, access to houses	OS1k18600			18.3	27.7	9.4	30	Medium	3 span bridge, two rows of 1x 1.5m columns plus bank seats for abutments	20	7	120	Site visit	20%	96	See Note on front sheet of Volume 1				Breached	18.3	0	60	990	1.3	29.2	10.8							
Zone 8	Axxx road at Rauros	OS1k26500			6.0	Neglect as broadly at flood plain				masonry arch bridge	7	2	12	Site visit	80%	2	See Note on front sheet of Volume 1				Embankment and structure not modelled				127	0.5	7.6	1.6	Flow reduced by spill to South						
Zone 8	Railway 3 - bridge West (downstream) of Rauros	OS1k26500			6.0	6.6	0.6	4	High	Horizontal steel bridge	7	0.5	3	Site visit	80%	1	See Note on front sheet of Volume 1				Embankment and structure not modelled				127	0.5	7.6	1.6	Flow reduced by spill to South						
Zone 9	Railway 3 - structures SW of Rauros	(storage area)													0		See Note on front sheet of Volume 1								n/a	n/a	4.3	n/a	Flood draindown routes not investigated						

Note : See Note on front sheet of Volume 1

Sunny day scenario																		
Zone 1	M61 motorway bridge SE Pelargir	OS1k03550			108.5	As above	As above	As above	See Note on front sheet of Volume 1	Breached	108.5	10	70	572	2.0	115.9	7.4	
Zone 2	Railway 1 - bridge SE Pelargir	OS1k05550			86.8					Breached	87.2	0	60	499	0.9	94.8	8.0	
Zone 3	Canal bridge over river SW of Railway 1	OS1k05570			87.4					Embankment and structure not modelled				499	1.9	94.5	7.0	Flood will also flow along canal route in both directions
Zone 3	Ax road bridge at Pelargir	OS1k06500_int63			75.3					Embankment and structure not modelled				296	1.9	79.4	4.0	
Zone 5	Railway 2 - dual bridges near Euxton	OS1k17000			28.1					Breached	28.0	20.0	80	205	1.3	33.0	4.8	
Zone 6	Axx road - Pxxxxx Bridge Byway immediately downstream (original route)	OS1k17400			28.3					Embankment and structure not modelled				205	2.0	31.1	2.8	
										Embankment and structure not modelled								
Zone 6	Ax motorway bridge. Gravel track under one side, access to houses	OS1k18600			18.3					Embankment and structure not modelled				205	0.7	24.4	6.1	
										Breached	18.3	0	60					
Zone 8	Axxx road at Rauros	OS1k26500			6.0					Embankment and structure not modelled				19	0.5	7.1	1.1	Flow reduced by spill to South
Zone 8	Railway 3 - bridge West (downstream) of Rauros	OS1k26500			6.0					Embankment and structure not modelled				19	0.5	7.1	1.1	Flow reduced by spill to South
Zone 9	Railway 3 - structures SW of Rauros	(storage area)			n/a					0.0				n/a	n/a	4.3	n/a	Flood draindown routes not investigated

[illegible]

Sunny day scenario

[illegible]

Table B.3R Anduin Schedule of Non-residential properties

Point definition						Property details								Model details			Calculations with input data			
Flood Zone Reference	Point Type	Name	Postcode	Easting	Northing	Num of bldgs	Plan area	Number of floors affected	Occupant area	Building occupancy	Occupancy factor	Remarks	Base PAR	Model Cross Section	Maximum Section Velocity	Maximum depth at point	Damage parameter	Damage Category (if statement on DV))	Damage cost £/m²	Total Damage Cost
	Type of Property (for occupancy rate)	(Text – Up to 40 characters)	Postcode (if address point in building)	Seven-digit OS co-ordinates			Total plan area in flood risk area (m²)		m² / person		% of hours occupied in year		Building occupancy x	As in model – blank for rapid method	m/s, to one decimal place	m, to one decimal place			(all floors affected)	
ZoneRef	PointType	PointName	Pcode	XCoordPt	YCoordPt		NonResArea							Pt CS	V	D	DxV	DamageCat		NonResCost
Zone 1	Farm						904	1	904	500	2	30%	1	OS1k01000_int308	3.2	0.9	2.88	Inundation	#REF!	#REF!
Zone 1 Totals						1	904		904		2		1							#REF!
Zone 2	Public House						310	1	310	10	31	15%	5	OS1k04400	5.5	3.0	16.53	Structural	#REF!	#REF!
Zone 2 Totals						1	310		310		31		4.65							#REF!
Zone 3	Factory						10000	1	10000	60	167	23%	38	OS1k07400	0.6	7.0	3.99	Inundation	#REF!	#REF!
Zone 3	Retail						390	1	390	30	13	23%	3	OS1k07400	0.6	5.5	3.14	Inundation	#REF!	#REF!
Zone 3	Public House						390	2	780	50	16	20%	6	OS1k07400	0.6	5.2	2.96	Inundation	#REF!	#REF!
Zone 3	Office						65	2	130	40	3	23%	1	OS1k06500_int137	7.1	4.0	28.52	Structural	#REF!	#REF!
Zone 3	Motor Trade						290	1	290	80	4	23%	1	OS1k06500_int137	7.1	5.5	39.22	Structural	#REF!	#REF!
Zone 3	Office						540	2	1080	40	27	23%	12	OS1k06500_int137	7.1	5.6	39.93	Structural	#REF!	#REF!
Zone 3	Recreation						6200	1	6200	300	21	15%	3	OS1k07500_int204	0.7	2.0	1.43	Inundation	#REF!	#REF!
Zone 3	Care Home						910	2	1820	50	36	100%	73	OS1k05570	1.9	2.6	5.05	Inundation	#REF!	#REF!
Zone 3	Hotel						280	2	560	50	11	50%	11	OS1k06500_int137	7.1	5.5	39.22	Structural	#REF!	#REF!
Zone 3	Office						280	2	560	40	14	23%	6	OS1k06500_int137	7.1	5.5	39.22	Structural	#REF!	#REF!
Zone 3	School						1305	1	1305	7	186	23%	43	OS1k07000	1.7	0.6	1.02	Inundation	#REF!	#REF!
Zone 3	Office assumed						130	1	130	40	3	23%	1	OS1k06000	2.8	3.2	9.08	Structural	#REF!	#REF!
Zone 3	Office assumed						170	1	170	40	4	23%	1	OS1k06000	2.8	3.2	9.08	Structural	#REF!	#REF!
Zone 3	Office assumed						226	1	226	40	6	23%	1	OS1k06000	2.8	2.6	7.38	Structural	#REF!	#REF!
Zone 3	Office assumed						133	1	133	40	3	23%	1	OS1k06000	2.8	1.6	4.54	Partial Structural	#REF!	#REF!
Zone 3	Office assumed						180	1	180	40	5	23%	1	OS1k06000	2.8	2.4	6.81	Partial Structural	#REF!	#REF!
Zone 3	Office assumed						223	1	223	40	6	23%	1	OS1k06000	2.8	3.7	10.50	Structural	#REF!	#REF!
Zone 3	Office assumed						171	1	171	40	4	23%	1	OS1k06000	2.8	5.4	15.33	Structural	#REF!	#REF!
Zone 3	Office assumed						377	1	377	40	9	23%	2	OS1k06500_int537	2.3	5.6	12.68	Structural	#REF!	#REF!
Zone 3 Totals						19	22260		24725		538		208							#REF!
Zone 4	Factory						8470	1	8470	60	141	23%	32	n/a	0.5	1.6	0.80	Inundation	#REF!	#REF!
Zone 4	Factory						1650	1	1650	60	28	23%	6	n/a	0.5	2.7	1.35	Inundation	#REF!	#REF!
Zone 4 Totals						2	10120		10120		169		39							#REF!
Zone 5	Motor Trade						560	1	560	80	7	23%	2	OS1k16000	2.4	3.6	8.69	Structural	#REF!	#REF!
Zone 5	Plant Nursery						780	1	780	100	8	30%	2	OS1k12000_int584	1.3	2.7	3.63	Inundation	#REF!	#REF!
Zone 5 Totals						2	1340		1340		14.8		3.95							#REF!
Zone 6	Factory						3000	1	3000	60	50	23%	12	OS1k18000_int173	1.0	1.5	1.55	Inundation	#REF!	#REF!
Zone 6 Totals						1	3000		3000		50		12							#REF!
Zone 7	Farm						620	1	620	200	3	30%	1	OS1k24000	0.8	0.4	0.33	Inundation	#REF!	#REF!
Zone 7	Farm						350	1	350	200	2	30%	1	OS1k22500	1.6	0.9	1.47	Inundation	#REF!	#REF!
Zone 7	Place of Worship						580	1	580	20	29	1%	0	OS1k22500	1.6	2.4	3.84	Inundation	#REF!	#REF!
Zone 7 Totals						3	1550		1550		34		2							#REF!
Zone 8	Retail						200	1	200	30	7	23%	2	OS1k26000	0.5	0.6	0.32	Inundation	#REF!	#REF!
Zone 8	Retail						10	1	10	5	2	23%	0	OS1k26000	0.5	0.1	0.03	Inundation	#REF!	#REF!
Zone 8	Offices						485	1	485	40	12	23%	3	OS1k26000	0.5	0.9	0.46	Inundation	#REF!	#REF!
Zone 8	Factory						65	1	65	30	2	23%	0	OS1k26000	0.5	2.0	1.07	Inundation	#REF!	#REF!
Zone 8	Retail						65	1	65	28	2	23%	1	OS1k26000	0.5	0.1	0.05	Inundation	#REF!	#REF!
Zone 8	Farm						510	1	510	200	3	30%	1	n/a	0.5	2.3	1.15	Inundation	#REF!	#REF!
Zone 8	Farm						660	1	660	200	3	30%	1	n/a	0.5	2.1	1.04	Inundation	#REF!	#REF!
Zone 8	Farm						820	1	820	200	4	30%	1	n/a	0.5	1.7	0.85	Inundation	#REF!	#REF!
Zone 8	Farm						600	1	600	200	3	30%	1	n/a	0.5	1.0	0.50	Inundation	#REF!	#REF!
Zone 8	Farm + Offices						4830	1	4830	160	30	30%	9	OS1k24500	0.6	2.0	1.26	Inundation	#REF!	#REF!
Zone 8	Offices						210	1	210	40	5	23%	1	OS1k26000	0.5	0.9	0.46	Inundation	#REF!	#REF!
Zone 8	Farm						1930	1	1930	300	6	70%	5	OS1k26000	0.5	1.2	0.64	Inundation	#REF!	#REF!
Zone 8	Retail						150	1	150	20	8	40%	3	OS1k26000	0.5	0.5	0.27	Inundation	#REF!	#REF!
Zone 8	School						2300	1	2300	7	329	20%	66	OS1k26000	0.5	1.3	0.69	Inundation	#REF!	#REF!

	Point definition						Property details							Model details			Calculations with input data			
Flood Zone Reference	Point Type	Name	Postcode	Easting	Northing	Num of bldgs	Plan area	Number of floors affected	Occupant area	Building occupancy	Occupancy factor	Remarks	Base PAR	Model Cross Section	Maximum Section Velocity	Maximum depth at point	Damage parameter	Damage Category (if statement on DV))	Damage cost £/m ²	Total Damage Cost
	Type of Property (for occupancy rate)	(Text – Up to 40 characters)	Postcode (if address point in building)	Seven-digit OS co-ordinates			Total plan area in flood risk area (m ²)		m ² / person		% of hours occupied in year		Building occupancy x	As in model – blank for rapid method	m/s, to one decimal place	m, to one decimal place			(all floors affected)	
ZoneRef	PointType	PointName	Pcode	XCoordPt	YCoordPt		NonResArea							Pt CS	V	D	DxV	DamageCat		NonResCost

Sub total Zones 1-6 26 37934 40399

Table B.3S Anduin Schedule of Non-residential properties - Sunny Day

Point definition						Property details								Model details			Calculations with input data			
Flood Zone Reference	Point Type	Name	Postcode	Easting	Northing	Num of bldgs	Plan area	Number of floors affected	Occupant area	Building occupancy	Occupancy factor	Remarks	Base PAR	Model Cross Section	Maximum Section Velocity	Maximum depth at point	Damage parameter	Damage Category	Damage cost £/m ²	Total Damage Cost
	Type of Property (for occupancy rate)	(Text – Up to 40 characters)	Postcode (if address point in building)	Seven-digit OS co-ordinates			Total plan area in flood risk area (m ²)		m ² / person		% of hours occupied in year		Building occupancy x	As in model – blank for rapid method	m/s, to one decimal place	m, to one decimal place				
ZoneRef	PointType	PointName	Pcode	XCoordPt	YCoordPt		NonResArea							Pt CS	V	D	DxV	DamageCat		NonResCost
Zone 1																				£0
Zone 1 Totals						1	0	0		0			0							£0
Zone 2	Public House						310	1	310	10	31	15%	5	OS1k04400	3.5	0.7	2.45	Inundation	#REF!	#REF!
Zone 2 Totals						1	310		310		31		4.65							#REF!
Zone 3	Factory						10000	1	10000	60	167	23%	38	OS1k07400	0.5	2.2	1.08	Inundation	#REF!	#REF!
Zone 3	Retail						390	1	390	30	13	23%	3	OS1k07400	0.5	0.8	0.39	Inundation	#REF!	#REF!
Zone 3	Public House						390	1	390	50	8	20%	2	OS1k07400	0.5	0.5	0.25	Inundation	#REF!	#REF!
Zone 3	Office						65	1	65	40	2	23%	0	OS1k06500_int137	3.2	2.0	6.38	Partial Structural	#REF!	#REF!
Zone 3	Motor Trade						290	1	290	80	4	23%	1	OS1k06500_int137	3.2	2.7	8.62	Structural	#REF!	#REF!
Zone 3	Office						540	1	540	40	14	23%	3	OS1k06500_int137	3.2	2.7	8.62	Structural	#REF!	#REF!
Zone 3	Recreation						750	1	750	300	3	15%	0	OS1k07500_int204	0.3	2.8	0.97	Inundation	#REF!	#REF!
Zone 3	Care Home						910	1	910	50	18	100%	18	OS1k05570	1.9	0.1	0.19	Inundation	#REF!	#REF!
Zone 3	Hotel						280	2	560	50	11	50%	11	OS1k06500_int137	3.2	2.3	7.36	Structural	#REF!	#REF!
Zone 3	Office						280	1	280	40	7	23%	2	OS1k06500_int137	3.2	2.3	7.36	Structural	#REF!	#REF!
Zone 3	Office assumed						130	1	130	7	19	23%	4	OS1k06000	2.5	0.2	0.50	Inundation	#REF!	#REF!
Zone 3	Office assumed						170	1	170	40	4	23%	1	OS1k06000	2.5	0.1	0.25	Inundation	#REF!	#REF!
Zone 3	Office assumed						223	1	223	40	6	23%	1	OS1k06000	2.5	0.5	1.24	Inundation	#REF!	#REF!
Zone 3	Office assumed						171	1	171	40	4	23%	1	OS1k06000	2.5	1.6	3.97	Partial Structural	#REF!	#REF!
Zone 3	Office assumed						377	1	377	40	9	23%	2	OS1k06500_int537	1.5	1.9	2.83	Inundation	#REF!	#REF!
Zone 3 Totals						16	14966		15246		287		88							#REF!
Zone 4	Factory						288	1	288	60	5	23%	1	n/a	0.5	0.5	0.25	Inundation	#REF!	#REF!
Zone 4	Factory						430	1	430	60	7	23%	2	n/a	0.5	0.5	0.25	Inundation	#REF!	#REF!
Zone 4 Totals						2	718		718		12		3							#REF!
Zone 5	Plant Nursery						780	1	780	100	8	30%	2	OS1k12000_int584	1.3	1.0	1.35	Inundation	#REF!	#REF!
Zone 5 Totals						1	780		780		7.8		2.3							#REF!
Zone 6	Factory						3000	1	3000	50	60	23%	14	OS1k18000_int173	0.5	1.0	0.54	Inundation	#REF!	#REF!
Zone 6 Totals						1	3000		3000		60		14							#REF!
Zone 7	Place of Worship						580	1	580	20	29	1%	0	OS1k22500	0.9	0.9	0.84	Inundation	#REF!	#REF!
Zone 7 Totals						1	580		580		29		0							#REF!
Zone 8	Offices						485	1	485	40	12	23%	3	OS1k26000	0.5	0.2	0.11	Inundation	#REF!	#REF!
Zone 8	Factory						65	1	65	40	2	23%	0	OS1k26000	0.5	1.3	0.69	Inundation	#REF!	#REF!
Zone 8	Farm						510	1	510	200	3	30%	1	n/a	0.5	1.1	0.55	Inundation	#REF!	#REF!
Zone 8	Farm						660	1	660	200	3	30%	1	n/a	0.5	0.9	0.45	Inundation	#REF!	#REF!
Zone 8	Farm						820	1	820	200	4	30%	1	n/a	0.5	0.8	0.40	Inundation	#REF!	#REF!
Zone 8	Farm						600	1	600	200	3	30%	1	n/a	0.5	0.6	0.30	Inundation	#REF!	#REF!
Zone 8	Farm + Offices						4830	1	4830	160	30	30%	9	OS1k24500	0.5	0.8	0.40	Inundation	#REF!	#REF!
Zone 8	Offices						210	1	210	40	5	23%	1	OS1k26000	0.5	0.1	0.05	Inundation	#REF!	#REF!
Zone 8	School						2300	1	2300	7	329	20%	66	OS1k26000	0.5	0.5	0.27	Inundation	#REF!	#REF!
Zone 8	Recreation						118	1	118	40	3	15%	0	OS1k26500	0.5	0.3	0.16	Inundation	#REF!	#REF!
Zone 8	Public House						190	1	190	10	19	15%	3	OS1k26000	0.5	0.1	0.05	Inundation	#REF!	#REF!
Zone 8	Public House						600	1	600	10	60	15%	9	OS1k26000	0.5	0.6	0.32	Inundation	#REF!	#REF!
Zone 8	Public House						390	1	390	10	39	15%	6	OS1k26000	0.5	0.1	0.05	Inundation	#REF!	#REF!
Zone 8	Retail						175	1	175	30	6	30%	2	OS1k26000	0.5	0.4	0.21	Inundation	#REF!	#REF!
Zone 8	Retail						80	1	80	30	3	30%	1	OS1k26000	0.5	0.5	0.27	Inundation	#REF!	#REF!
Zone 8	Place of Worship						213	1	213	5	43	5%	2	OS1k25500	0.8	0.6	0.46	Inundation	#REF!	#REF!
Zone 8	Office assumed						241	1	241	40	6	23%	1	OS1k26500	0.5	0.8	0.37	Inundation	#REF!	#REF!
Zone 8	Farm						3455	1	3455	300	12	30%	3	n/a	0.5	1.2	0.60	Inundation	#REF!	#REF!
Zone 8 Totals						18	15942		15942		580		111							#REF!
Zone 9	Farm						958	1	958	500	2	30%	1	n/a	0.5	0.2	0.10	Inundation	#REF!	#REF!
Zone 9 Totals						1	958		958		2		1							#REF!

Point definition					Rainy day - Hydraulic model output					Notes	Sunny day - Hydraulic model output				
Flood Zone Reference	Name of Risk Location	Model Cross Section Immediately Upstream	Easting	Northing	Maximum discharge	Maximum Average Velocity	Maximum Flood Elevation	Floodplain Elevation	Maximum Floodplain Depth		Maximum discharge	Maximum Average Velocity	Maximum Flood Elevation	Floodplain Elevation	Maximum Floodplain Depth
	Text – Up to 40 characters	Section name in model – blank for rapid method	Seven-digit OS co-ordinates		m ³ /s	m/s, to one decimal place	mAOD, to one decimal place	mAOD, to one decimal place	m, to one decimal place		m ³ /s	m/s, to one decimal place	mAOD, to one decimal place	mAOD, to one decimal place	m, to one decimal place
ZoneRef	PointName	Pt_CS	XCoordPt	YCoordPt	Qmax	MaxVel	MaxStage	GroundLevel	MaxDepth		Qmax	MaxVel	MaxStage	GroundLevel	MaxDepth
Zone 1	High pressure gas main near dam	OS1k01000_int308			2920	3.2	124.9	118.5	6.4		766	2.5	121.8	118.5	3.3
Zone 3	A-road along flood plain	OS1k06500			2021	8.2	93.3	91.0	2.3	Levels quoted for typical point on road on floodplain Flood would flow across road to cut off meander	496	3.8	91.7	91.0	0.7
Zone 6	Axxx road West of Pxxxxx Bridge	OS1k18000_int073			990	1.2	31.6	24.5	7.1		205	0.8	28.1	24.5	3.6
Zone 8	A581 road through Rauros	OS1k25000			687	0.7	10.5	6.9	3.6	Flow reduced by spill to South	140	0.5	9.3	6.9	2.4