



Science and  
Technology  
Facilities Council

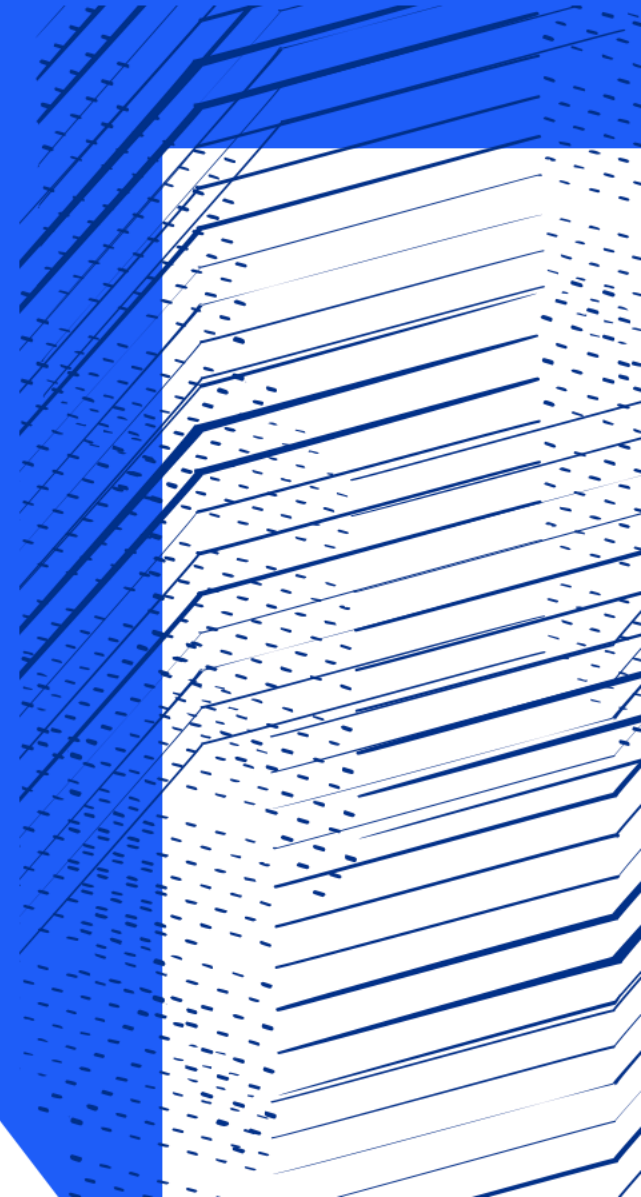
# ITRF/LhARA

# Project Review

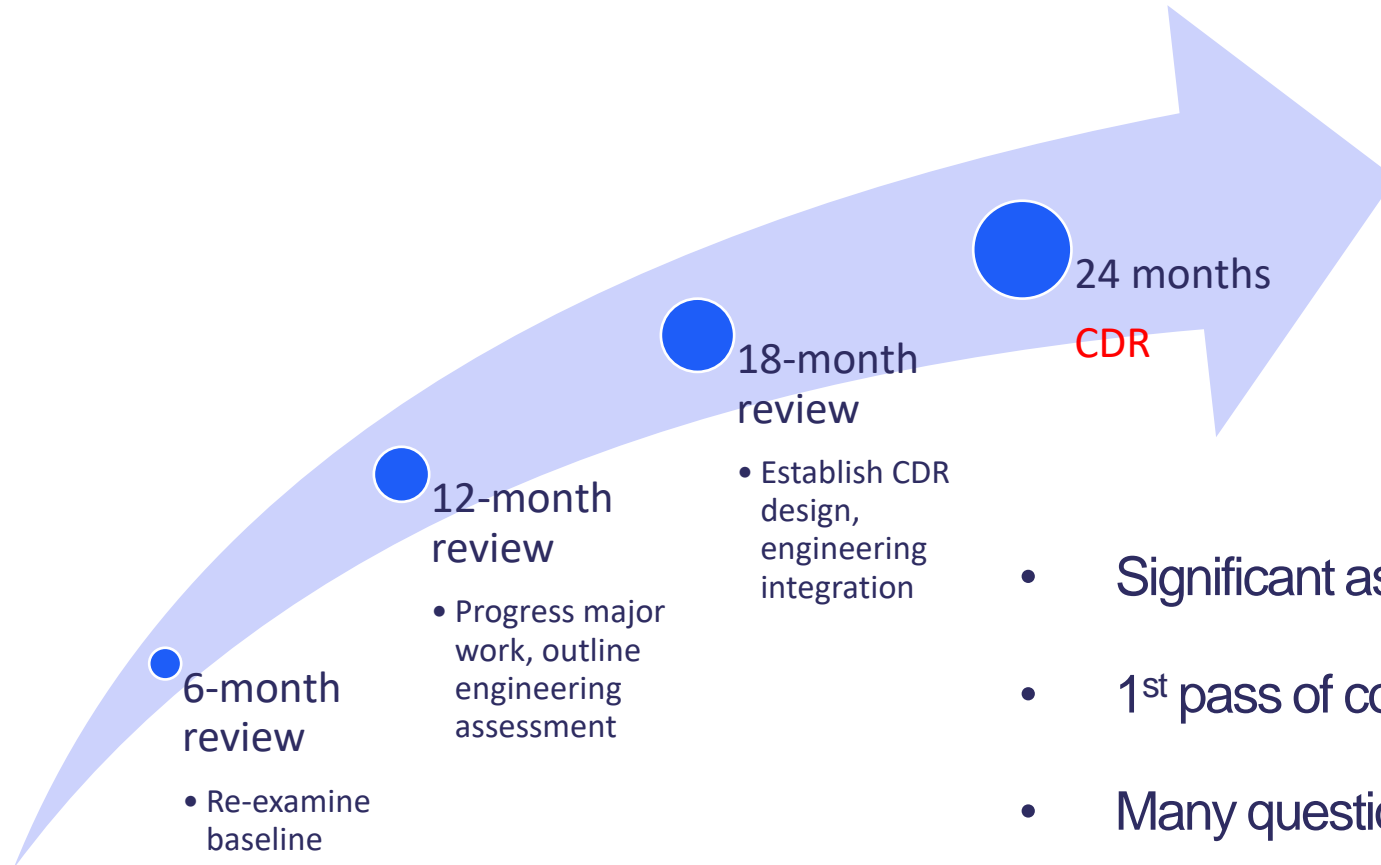
## 24-month review

Hywel Owen (for collaboration)

2<sup>nd</sup> September 2024



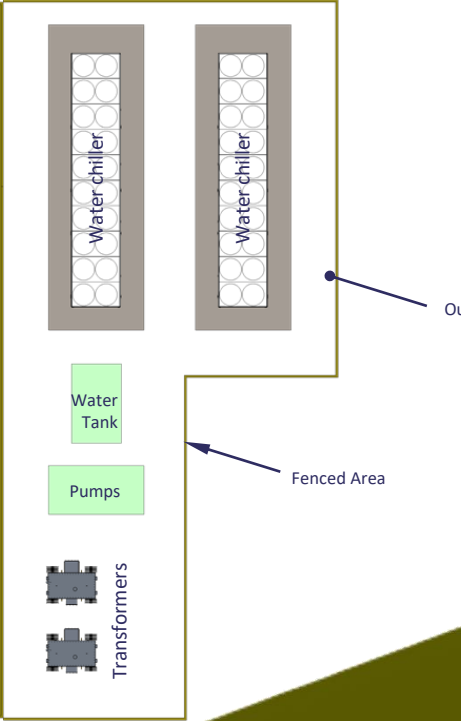
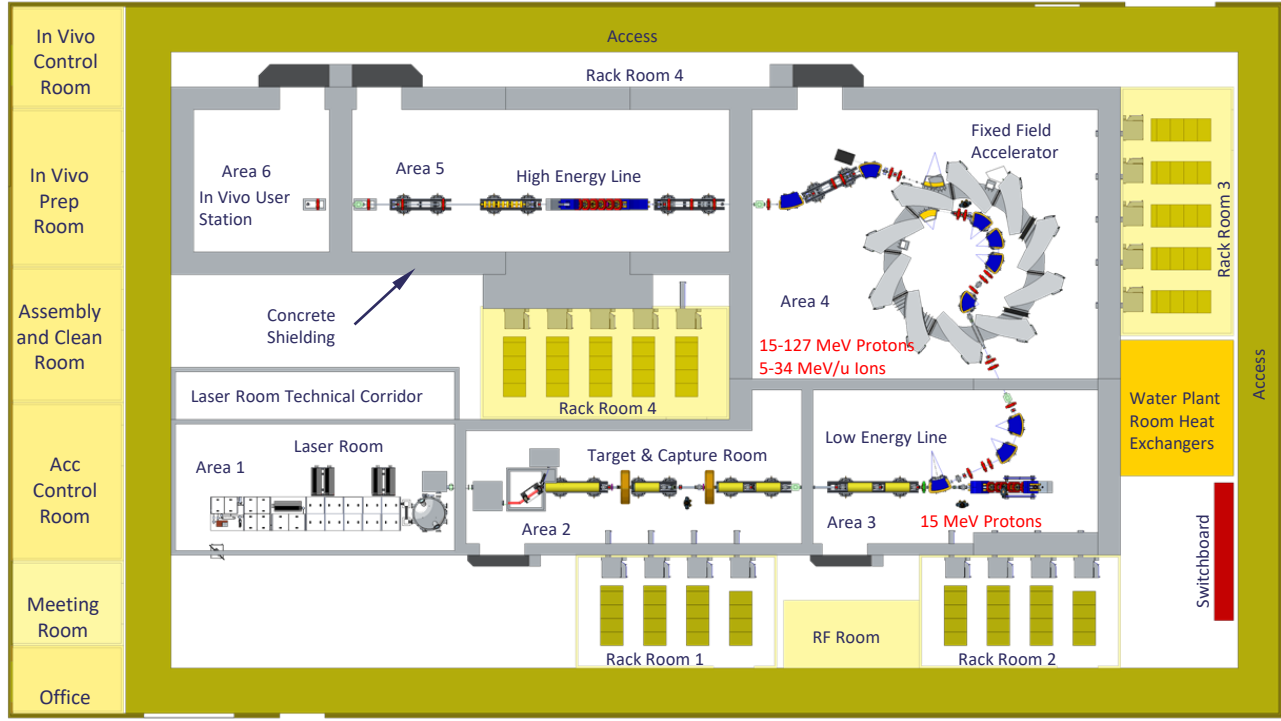
# Where are we?



- Significant assessment of facility now carried out
- 1<sup>st</sup> pass of costing done
- Many questions brought to light  
...what we wanted!
- Need to balance benefits vs. costs and risks

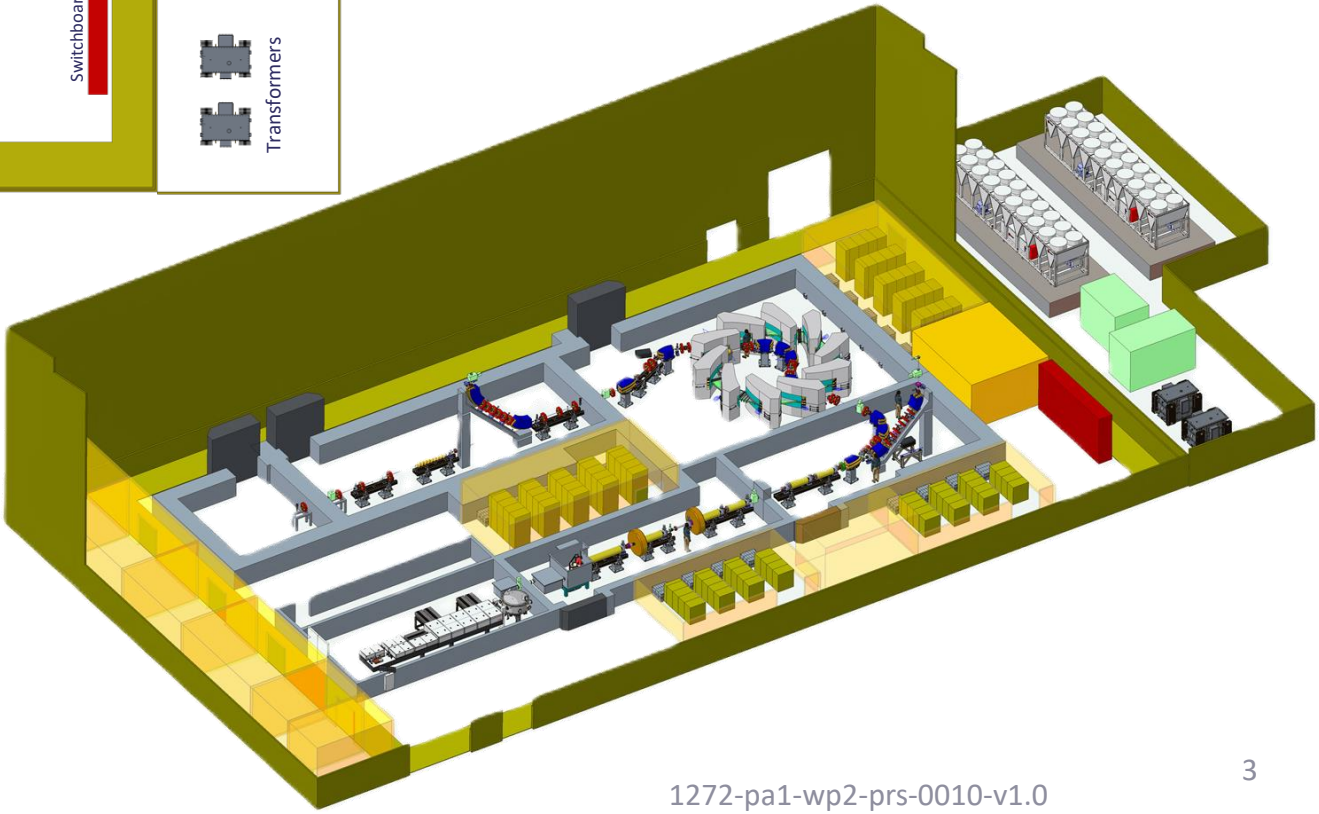
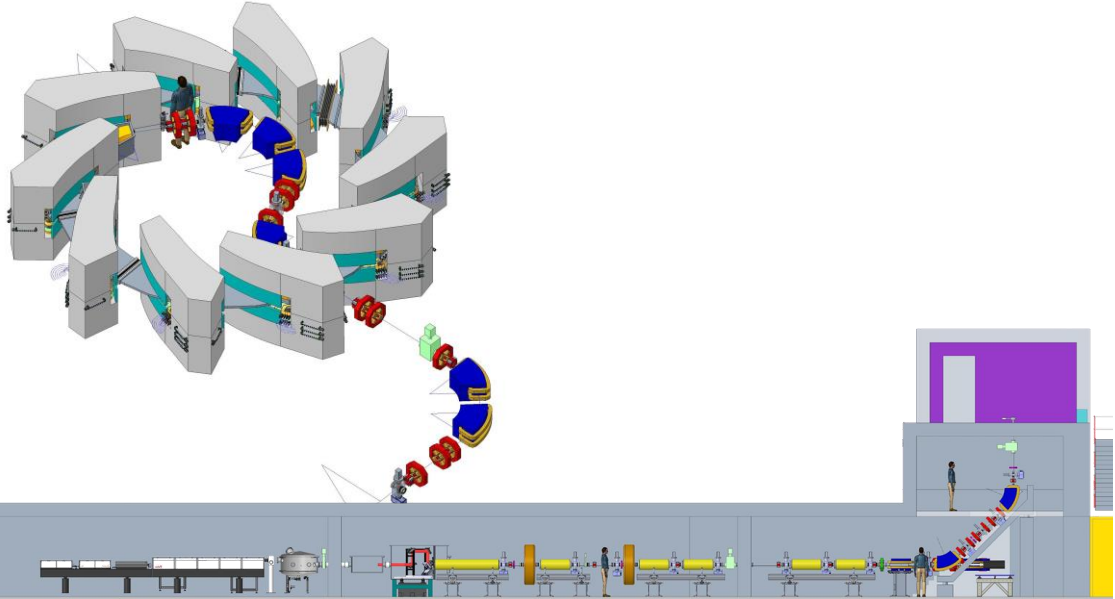
71m

32m



# LhARA/ITRF Layout

(courtesy Clive Hill)




Date	Event
April 2024	10th ITRF Advisory Committee meeting.
April 2024	18 Month Review Meeting (25/26 April, London) <a href="https://indico.stfc.ac.uk/event/986/">https://indico.stfc.ac.uk/event/986/</a>
May 2024	Bridging Funding Proposal/ clarifications Updated and submitted
June 2024	18 Month Review Published
June 2024	21 Month Review – CDR write up starts
September 2024	24 Month Review (Belfast)



<https://stfc365.sharepoint.com/sites/ITRF>



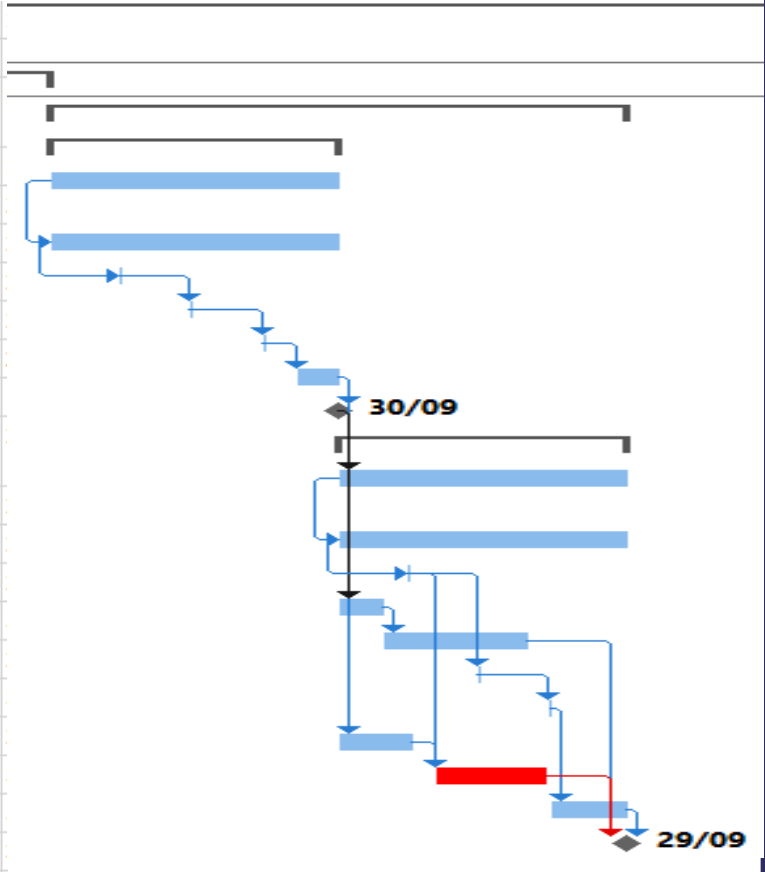


ITRF/LhARA  
Conceptual Design Report

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# Original Schedule – over Full Construction Project

WBS	Task Name	Duration	Start	Finish	2023	2024	2025	2026	2027	2028	2029
1.3	▾ Technical Design Report (TDR) - 4 years - UKRI Infrastructure Fund PA2	1044 days	Tue 01/10/24	Fri 29/09/28							
1.3.1	▾ LhARA Stage 1 Technical Design Report (TDR) - 2 years	522 days	Tue 01/10/24	Wed 30/09/26							
1.3.1.1	Project Management Plan; Scope, Specifications, Risk, Finance, Stakeholders, Deliverables ....	522 days	Tue 01/10/24	Wed 30/09/26							
1.3.1.2	Technical studies & engineering design - stage 1 & stage 2 prototypes	522 days	Tue 01/10/24	Wed 30/09/26							
1.3.1.3	Design Review 1 (6 month)	1 day	Wed 19/03/25	Wed 19/03/25							
1.3.1.4	Design Review 2 (12 month)	1 day	Wed 17/09/25	Wed 17/09/25							
1.3.1.5	Design Review 2 (18 month)	1 day	Wed 18/03/26	Wed 18/03/26							
1.3.1.6	Write stage 1 TDR	76 days	Wed 17/06/26	Wed 30/09/26							
1.3.1.7	Stage 1 TDR Complete	0 days	Wed 30/09/26	Wed 30/09/26							
1.3.2	▾ LhARA Stage 2 Technical Design - 2 years	522 days	Thu 01/10/26	Fri 29/09/28							
1.3.2.1	Project Management Plan; Scope, Specifications, Risk, Finance, Stakeholders, Deliverables ....	522 days	Thu 01/10/26	Fri 29/09/28							
1.3.2.2	Technical studies, engineering design & prototype procurement	522 days	Thu 01/10/26	Fri 29/09/28							
1.3.2.3	Design Review 2 (6 months) part of TDR	1 day	Wed 17/03/27	Wed 17/03/27							
1.3.2.4	Tender & award contract for stage 2 prototypes	80 days	Thu 01/10/26	Wed 20/01/27							
1.3.2.5	Procure & test prototypes	261 days	Thu 21/01/27	Thu 20/01/28							
1.3.2.6	Design Review 3 (12 months) part of TDR	1 day	Wed 15/09/27	Wed 15/09/27							
1.3.2.7	Design Review 3 (18 months) part of TDR	1 day	Wed 15/03/28	Wed 15/03/28							
1.3.2.8	Building specification & Layout	131 days	Thu 01/10/26	Thu 01/04/27							
1.3.2.9	Architect design	200 days	Tue 01/06/27	Mon 06/03/28							
1.3.2.10	Write stage 2 TDR	142 days	Thu 16/03/28	Fri 29/09/28							
1.3.2.11	Stage 2 TDR phase complete	0 days	Fri 29/09/28	Fri 29/09/28							



# New TL Schedule – BP1 to Full Construction

Under discussion/bid

	Y1	Y1	Y2	Y2	Y3	Y3	Y4	Y4	Y5	Y5	Y6	Y6	Y7	Y7	Y8	Y8	Y9	Y9
	FY22/23	FY23/24	FY23/24	FY24/25	FY24/25	FY25/26	FY25/26	FY 26/27	FY 26/27	FY 27/28	FY 27/28	FY 28/29	FY 28/29	FY 29/30	FY 29/30	FY 30/31	FY 30/31	FY 31/32
PA1 - CDR																		
BP1 - Stage 1 TDR																		
BP1 - Stage 2 R & D (FFA Magnets)																		
Building Specification & Contract Mobilisation																		
Building (Inc M&E fit out)																		
Stage 1 (In Vitro) Design (Laser / Accelerator / Beamline / shielding etc.)																		
Stage 1 (In Vitro) Procurement (Laser / Accelerator / Beamline / shielding etc.)																		
Stage 1 (In Vitro) Module Build (offline assembly)																		
Stage 1 (In Vitro) Installation works																		
Stage 1 (In Vitro) Commissioning																		
Stage 1 (In Vitro) Operational																		
Stage 2 (In Vivo) TDR																		
Stage 2 (In Vivo) Design (FFA / Beamline / shielding etc.)																		
Stage 2 (In Vivo) Procurement (Laser / Accelerator / Beamline / shielding etc.)																		
Stage 2 (In Vivo) Module Build (offline assembly)																		
Stage 2 (In Vivo) Installation works																		
Stage 2 (In Vivo) Commissioning																		
Stage 2 (In Vivo) Operational																		

PA1

BP1

Staged Build



Facility Site Decision



Decision Gateway

IF 'rules of the game' changed at half-time.  
 General funding pressures within UKRI.  
 Need to diversify our plan.

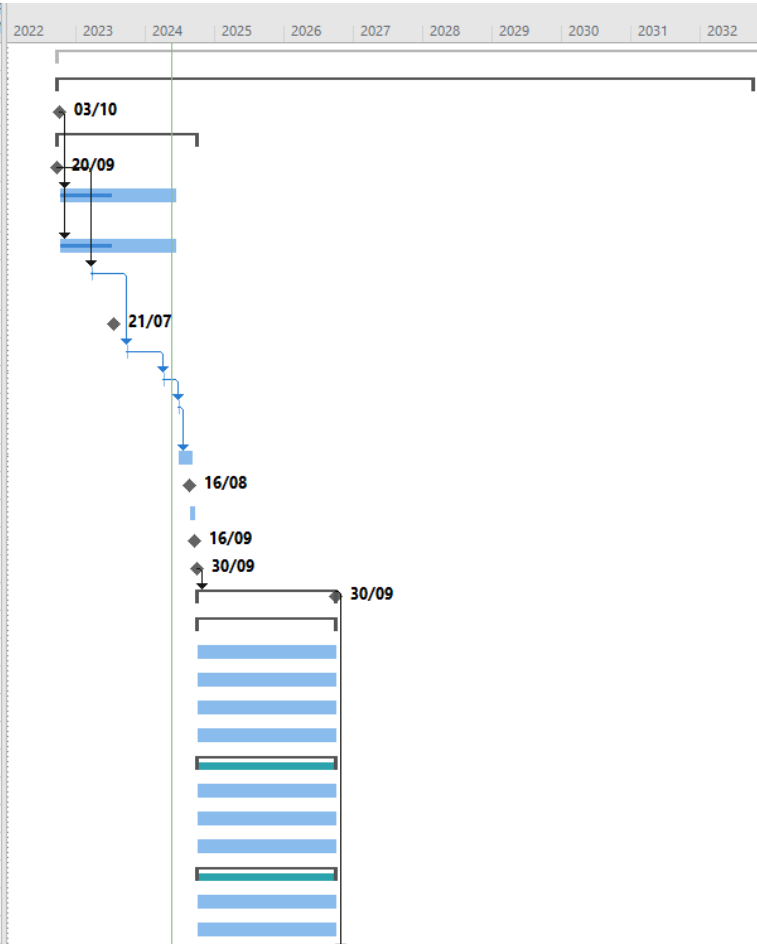
Documents: 1272-bp1-pm-ppl-0001-v1.0 - ITRF\_LhARA\_Top Level Schedule 2024-02-14.xlsx



2yr BP1 → Bid for staged construction

# Updated Schedule – Construction Project Starts (TDR stage) 01/10/2026

	WBS	Task Name	Duration	Start	Finish	Predecessors
0	0	<b>ITRF schedule</b>	<b>2879 days</b>	<b>Tue 20/09/22</b>	<b>Fri 30/09/33</b>	
1	1	<b>ITRF</b>	<b>2617 days</b>	<b>Tue 20/09/22</b>	<b>Wed 29/09/32</b>	
2	1.1	<b>Project Start</b>	<b>0 days</b>	<b>Mon 03/10/22</b>	<b>Mon 03/10/22</b>	
3	1.2	<b>Conceptual Design Report (CDR) - 2 years - UKRI Infrastructure Fund PA1</b>	<b>529 days</b>	<b>Tue 20/09/22</b>	<b>Mon 30/09/24</b>	
4	1.2.1	Project Kick-off meeting	0 days	Tue 20/09/22	Tue 20/09/22	
5	1.2.2	Project Management Plan; scope, specifications, risk, finance, stakeholders, deliverables ....	437 days	Mon 03/10/22	Tue 04/06/24	2
6	1.2.3	Technical studies	437 days	Mon 03/10/22	Tue 04/06/24	2
7	1.2.4	Preliminary Conceptual Design Review (6 months) - refine scope, specifications, define parameters and schematic diagram of facility equipment.	1 day	Tue 21/03/23	Tue 21/03/23	4
8	1.2.5	<b>UKRI IF Wave 4 bid deadline</b>	<b>0 days</b>	<b>Fri 21/07/23</b>	<b>Fri 21/07/23</b>	
9	1.2.6	Interim Conceptual Design Review 1 (12 months) - specify baseline design	1 day	Wed 20/09/23	Wed 20/09/23	7
10	1.2.7	Interim Conceptual Design Review 2 (18 months) - refine specification & design	1 day	Wed 03/04/24	Wed 03/04/24	9
11	1.2.8	Final Conceptual Design Meeting (21 months) - final specification & design ready for CDR write up	1 day	Thu 20/06/24	Thu 20/06/24	10
12	1.2.9	Start CDR writing	52 days	Fri 21/06/24	Mon 02/09/24	11
13	1.2.10	Chapter authors complete CDR writing	0 days	Fri 16/08/24	Fri 16/08/24	
14	1.2.11	Proof reading and final adjustments to CDR	22 days	Mon 19/08/24	Tue 17/09/24	
15	1.2.12	CDR Publication	0 days	Mon 16/09/24	Mon 16/09/24	
16	1.2.13	<b>CDR phase complete</b>	<b>0 days</b>	<b>Mon 30/09/24</b>	<b>Mon 30/09/24</b>	
17	1.3	<b>Bridging Period 1</b>	<b>522 days</b>	<b>Tue 01/10/24</b>	<b>Wed 30/09/26</b>	16
18	1.3.1	<b>Work Package A - Radiobiological Experimentation &amp; Modelling</b>	<b>522 days</b>	<b>Tue 01/10/24</b>	<b>Wed 30/09/26</b>	
19	1.3.1.1	WP A.7 - Radiobiology Experiments	522 days	Tue 01/10/24	Wed 30/09/26	
20	1.3.1.2	WP A.4 - Ion acoustic dose measurements	522 days	Tue 01/10/24	Wed 30/09/26	
21	1.3.1.3	WP A.5 - End station and novel diagnostics	522 days	Tue 01/10/24	Wed 30/09/26	
22	1.3.1.4	WP A.2 - Source for Radiobiology Expt	522 days	Tue 01/10/24	Wed 30/09/26	
23	1.3.2	<b>Work Package B - ITRF/Lhara R&amp;D</b>	<b>522 days</b>	<b>Tue 01/10/24</b>	<b>Wed 30/09/26</b>	
24	1.3.2.1	WP B.6 - FFA Feasibility Study	522 days	Tue 01/10/24	Wed 30/09/26	
25	1.3.2.2	WP B.2 - Source	522 days	Tue 01/10/24	Wed 30/09/26	
26	1.3.2.3	WP B.3 - Capture	522 days	Tue 01/10/24	Wed 30/09/26	
27	1.3.3	<b>Work Package C - Project Management</b>	<b>522 days</b>	<b>Tue 01/10/24</b>	<b>Wed 30/09/26</b>	
28	1.3.3.1	WP C.1 - Project Management	522 days	Tue 01/10/24	Wed 30/09/26	
29	1.3.3.2	WP C.8 - Outreach & Engagement	522 days	Tue 01/10/24	Wed 30/09/26	



# Updated Schedule – Bridging Period 01/10/2026

Task ID	WBS	Task Mode	Task Name	Finish	Resource Names	Timeline (Half 2, 2025 to Half 2, 2027)																													
						J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
25	3		WPC	Wed 30/09/26																															
31	3.2		Task 8	Wed 30/09/26	P. Price																														
36	3.2.2		Wider public engagement - All part parliamentary group on radiotherapy	Wed 30/09/26																															
39	3.2.2.3		Website maintenance																																
38	3.2.2.2		Content creation and development																																
37	3.2.2.1		Patient engagement group programme																																
32	3.2.1		Creation of collaborative international clinical research group	Sat 31/01/26																															
35	3.2.1.3		Patient engagement session																																
34	3.2.1.2		Website build and maintenance																																
33	3.2.1.1		Launch event for LhARA																																
26	3.1		Task 1	Wed 30/09/26	C. Pugh, C. Whyte																														
30	3.1.4		PoPLaR and LhARA de-risk report	Wed 30/09/26																															
29	3.1.3		Final PoPLaR and LhARA de-risk update	Tue 31/03/26																															
28	3.1.2		Interim PoPLaR and LhARA de-risk update	Tue 30/09/25																															
27	3.1.1		Initial PoPLaR and LhARA de-risk update	Mon 31/03/25																															
16	2		WPB	Wed 30/09/26																															
23	2.3		Task 6	Tue 31/03/26																															
24	2.3.1		Final review of R&D work	Tue 31/03/26																															
20	2.2		Task 3	Wed 30/09/26																															
22	2.2.2		Final report higher voltage penning trap operation	Wed 30/09/26																															
21	2.2.1		Progress report on increased voltage penning trap simulations and operation	Tue 30/09/25																															
17	2.1		Task 2	Wed 30/09/26																															
19	2.1.2		2.4 Assessment of beam performance during PoPLaR experiment on SCAPA	Wed 30/09/26																															
18	2.1.1		2.3 Investigation and demonstration of 10 Hz debris and damage challenges at ICL	Tue 30/09/25																															
1	1		WPA	Wed 30/09/26																															
13	1.4		Task 5	Wed 30/09/26	R. Amos, T. Price																														
15	1.4.2		5.6 Report on LhARA stage 1 beam monitoring system	Wed 30/09/26																															
14	1.4.1		5.4 Deliver PoPLaR end-station	Mon 30/06/25																															
10	1.3		Task 4	Wed 30/09/26	J. Bamber																														
12	1.3.2		4.5 LhARA ion-acoustic test results	Wed 30/09/26																															
11	1.3.1		4.3 Design for ion-acoustic dose-profile measurement for PoPLaR	Tue 31/03/26																															
8	1.2		Task 9	Tue 30/09/25	R. Gray																														
9	1.2.1		9.1 Demonstration of beam delivery to end station	Tue 30/09/25																															
2	1.1		Task 7	Wed 30/09/26	J. Parsons																														
7	1.1.5		7.5 Assessment of DNA damage repair kinetics and immunopeptidomic analysis	Wed 30/09/26																															
6	1.1.4		7.4 Assessment of cell survival analysis (RBE's) of laser-accelerated protons	Wed 30/09/26																															
5	1.1.3		7.3 Preliminary results from DNA damage and repair experiments at SCAPA	Wed 31/12/25																															
4	1.1.2		7.2 Preliminary results from cell survival experiments at SCAPA	Tue 30/09/25																															
3	1.1.1		7.1 Develop beamline and bespoke facilities at SCAPA for radiobiology experimentation	Mon 31/03/25																															



# Steps on the way...

- User case/science case/business case (what Benefits?)
- Costing/operations/siting
- Sustainability and powering
- Technical risks and development stages