



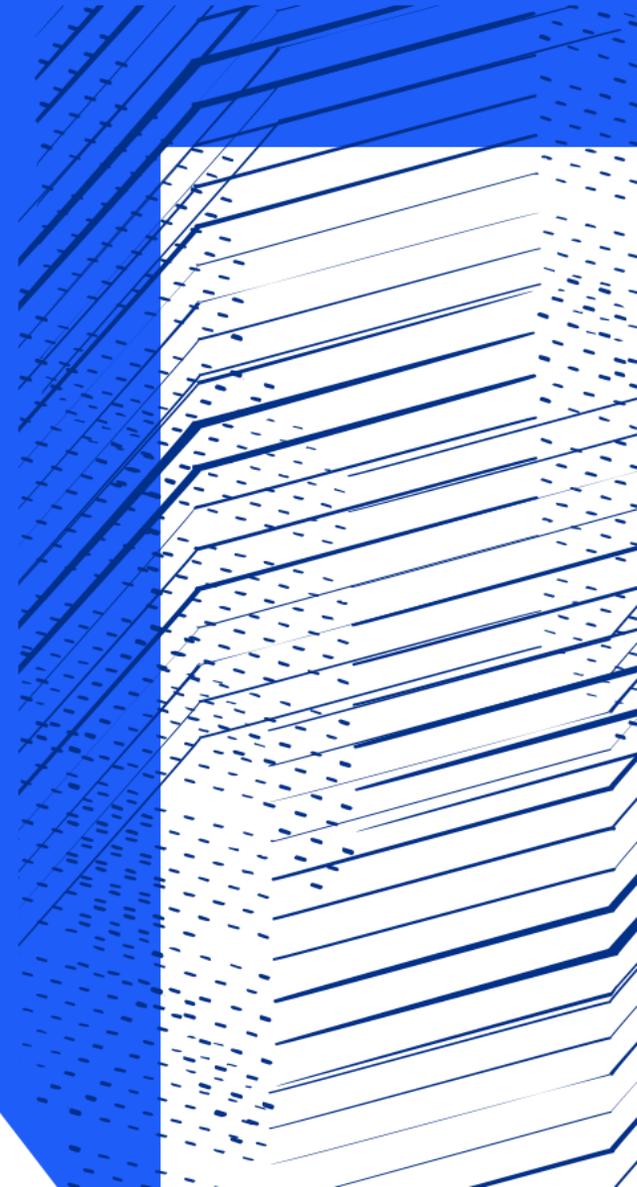
Science and
Technology
Facilities Council

ITRF/LhARA Timetable

18-month review

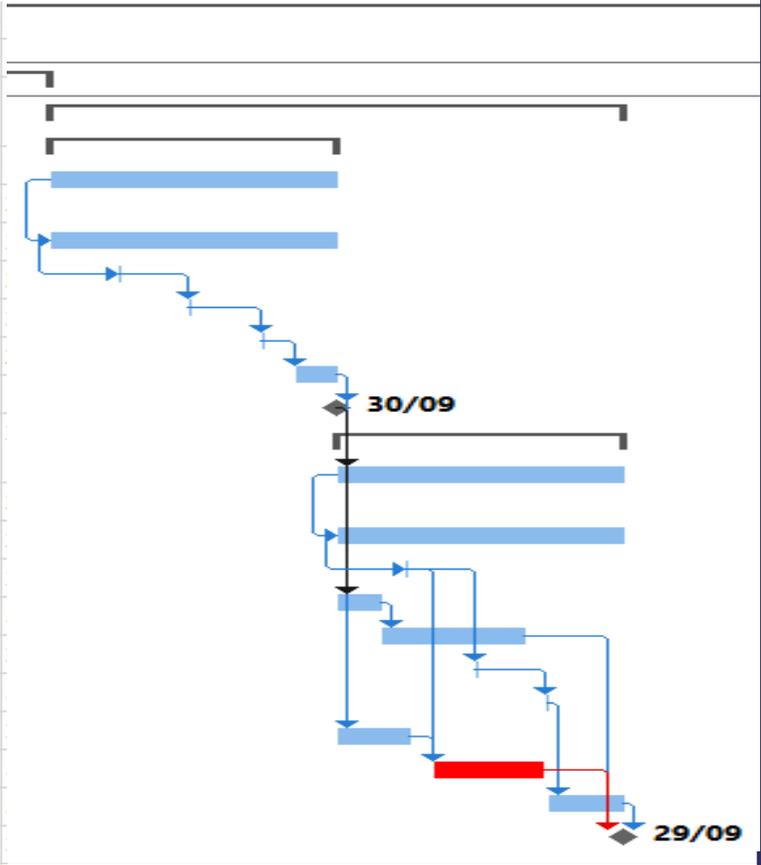
Hywel Owen (for collaboration)

25th April 2024



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.

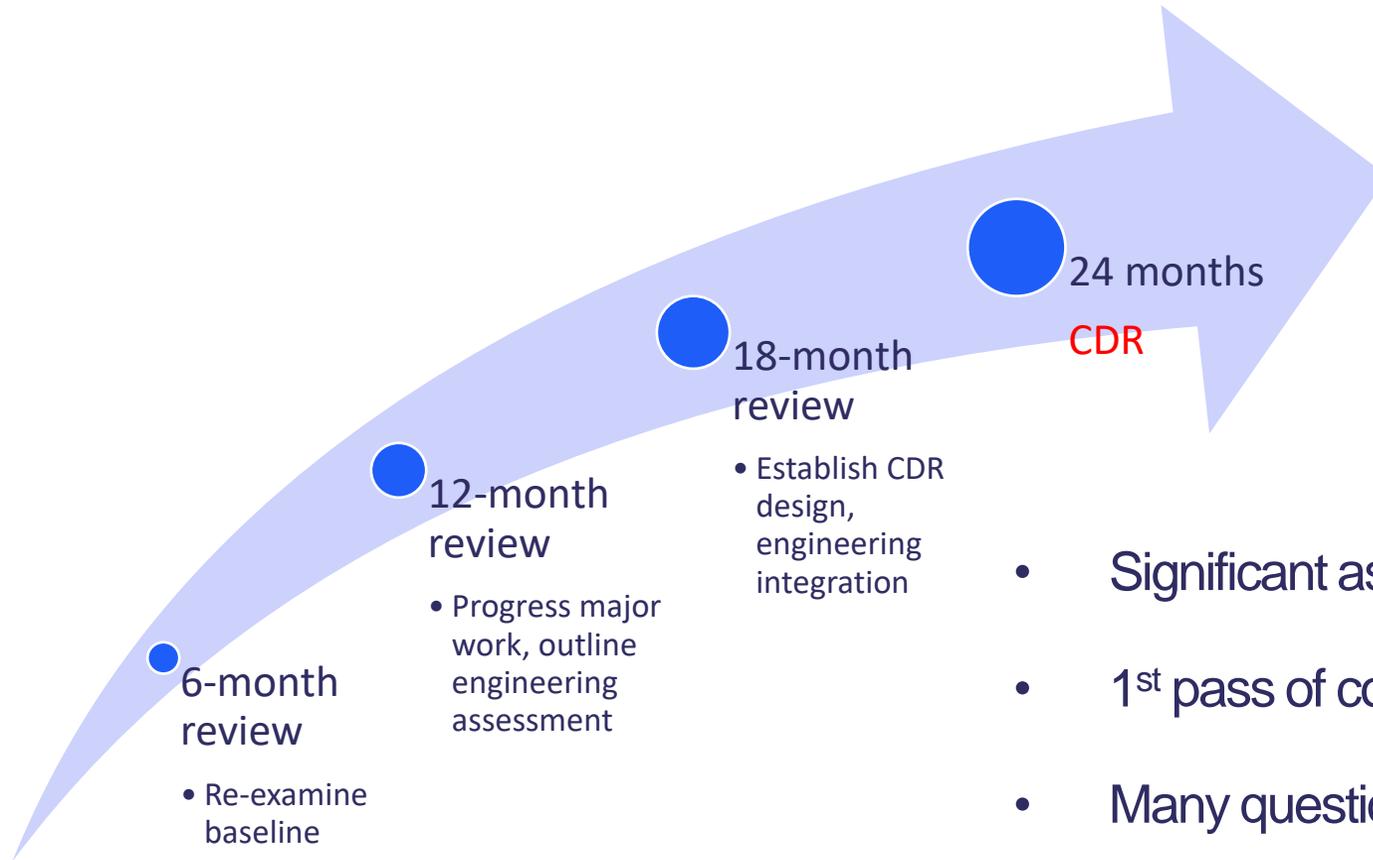
Documents: 1272-bp1-pm-ppl-0001-v1.0 - ITRF_LhARA_Top Level Schedule 2024-02-14.xlsx

Milestones and Deliverables, 1272-pa1-pm-ppl-0005-v1.0

| Document: 1272-pa1-pm-ppl-0005-v1.0 - ITRF milestones and deliverables 2022-10-18 | | | Date | |
|---|----------|---|--------------|---|
| WBS | ITRF No. | High Level Milestones | Date | |
| 1 | | Project start | Mon 03/10/22 | |
| 2.2.1 | | ITRF Team Kick-Off meeting at STFC Daresbury Laboratory | Tue 20/09/22 | |
| 2.2.2 | | ITRF IF monitoring kick off meeting | Wed 28/09/22 | |
| 3.1 | | D1: Y1Q1 IF progress report | Thu 15/12/22 | |
| 4.6.2 | M1 | LhARA lattice optimisation, aperture estimation, parameter list and schematic diagram update | Tue 31/01/23 | |
| 2.2.5 | M2 | Refined scope, specifications, defined parameters and schematic diagram of facility equipment complete (6 month design review) | Thu 23/03/23 | |
| 3.2 | | D2: Y1Q2 IF progress report | Fri 31/03/23 | |
| 4.3.2 | M3 | Validate LhARA plasma simulations with existing Swansea experimental set-up (LhARA M3.1) | Mon 03/04/23 | |
| 3.3 | | D3: Y1Q3 IF progress report | Fri 30/06/23 | |
| 2.2.7 | M4 | ITRF Baseline designs complete (12 month design review). | Thu 21/09/23 | |
| 3.4 | | D4: Y1Q4 IF progress report | Fri 29/09/23 | |
| 4.2.2 | M5 | Prediction of optimised LhARA proton source parameters for 100+ TW laser systems based on hydrodynamic and kinetic simulations complete (LhARA M2.1) | Mon 02/10/23 | |
| 3.5 | | D5: Y2Q1 IF progress report | Fri 15/12/23 | |
| 4.6.4 | M6 | Preliminary design of LhARA MA RF cavity, FFA magnet, diagnostic system, control & feedback systems complete. | Thu 28/03/24 | * |
| 5.2 | M7 | Preliminary design study of LhARA Building concept design, bulk shielding assessment, mechanical systems integration support concepts, vacuum concepts, power consumption & cooling requirements complete. | Thu 28/03/24 | * |
| 4.2.3 | M8 | First LhARA ion source simulations and experiment on SCAPA completed (LhARA M2.2) | Mon 01/04/24 | * |
| 4.3.3 | M9 | Progress report of LhARA large diameter plasma experiments and simulations (LhARA M3.2) | Mon 01/04/24 | * |
| 4.3.3 | M10 | Geant4 simulations of beam energy deposition profile (LhARA M4.1) | Mon 01/04/24 | * |
| 2.2.9 | M11 | Refined ITRF specifications & designs (18 month design review). | Thu 21/03/24 | * |
| 3.6 | | D6: Y2Q2 IF progress report | Fri 29/03/24 | * |
| 2.2.12 | M12 | Start ITRF CDR write up (21 month design meeting). | Thu 20/06/24 | |
| 3.7 | | D7: Y2Q3 IF progress report | Fri 28/06/30 | |
| 4.6.14 | M13 | Finalise Conceptual Design iterations (All LhARA WP6 systems) complete | Wed 24/07/24 | |
| 4.3.4 | M14 | Next generation plasma lens test bench design (LhARA M3.3) | Fri 30/08/24 | |
| 4.4.3 | M15 | Acoustic sensor array design complete (LhARA M4.2) | Fri 30/08/24 | |
| 4.5.3 | M16 | Automated cell dish handling and environmental system design complete (LhARA M5.1), End-station user-community consultation complete (LhARA M5.2), End-station component testing at Birmingham complete (LhARA M5.3), kG,y/s tests at Birmingham complete (LhARA M5.7). | Fri 30/08/24 | |
| 4.5.6 | M17 | Specification of LhARA beam monitoring technology complete (LhARA M5.5) | Fri 30/08/24 | |
| 2.2.16 | M18 | ITRF CDR Publication | Mon 23/09/24 | |
| 2.2.17 | M19 | ITRF CDR phase complete | Mon 30/09/24 | |
| 3.8 | | D8: Y2Q4 IF progress report | Mon 30/09/24 | |

- M6/M7 Draft complete: 1272-pa1-pm-rpt-0008
- 1272-pa1-acc-para-0004-v0.8-ITRFLhARA operation and loss points -> shielding contract

Where did we want to be?



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

Where do we want to go?

- Have robust answers from our internal and external reviews
- Know what we can and can't offer
- Be in a good position for the next stage of the project

- **Sustainability** will be pivotal for funding; recent source, Gabor, FFA, engineering, and shielding work allows us to assess the energy and emissions footprint over its lifetime.

