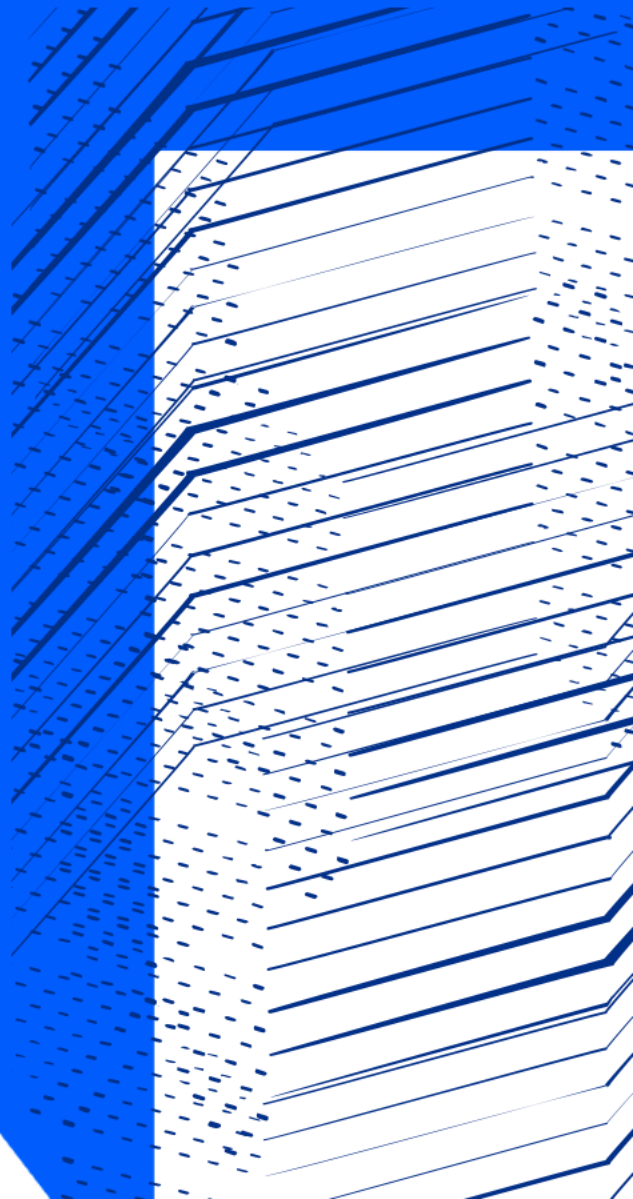
Science and Technology Facilities Council

ITRF Project

WP2 – ITRF Facilities & Costing

ITRF Project Kick-Off meeting 20th September 2022

Neil Bliss



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7. Planning & Designing for Sustainability
8. Costing

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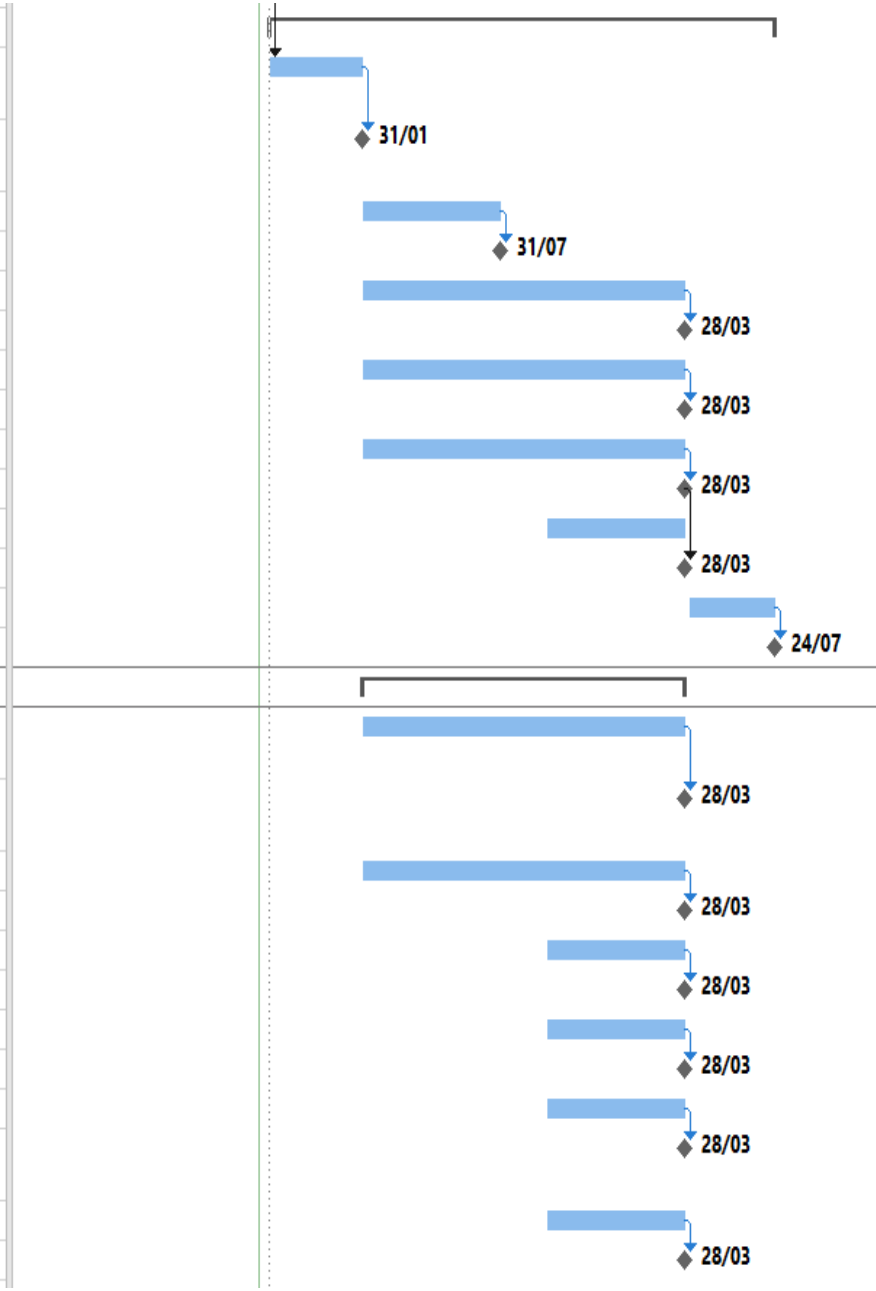
Schedule – LhARA WP1.6 & WP2

4.6	**WP1.6 LhARA Facility design & Integration**	**473 days**	**Mon 03/10/22**	**Wed 24/07/24**	
4.6.1	LhARA lattice optimisation, aperture estimation, parameter list and schematic diagram update	87 days	Mon 03/10/22	Tue 31/01/23	1
4.6.2	M1: LhARA lattice optimisation, aperture estimation, parameter list and schematic diagram update	0 days	Tue 31/01/23	Tue 31/01/23	55
4.6.3	Preliminary design of LhARA mitigating solenoid	129 days	Wed 01/02/23	Mon 31/07/23	
4.6.4	M3: Preliminary design of LhARA mitigating solenoid complete	0 days	Mon 31/07/23	Mon 31/07/23	57
4.6.5	Preliminary design of LhARA MA RF cavity	302 days	Wed 01/02/23	Thu 28/03/24	
4.6.6	M5: Preliminary design of LhARA MA RF cavity complete	0 days	Thu 28/03/24	Thu 28/03/24	59
4.6.7	Preliminary design of LhARA FFA magnet	302 days	Wed 01/02/23	Thu 28/03/24	
4.6.8	M6: Preliminary design of LhARA FFA magnet complete	0 days	Thu 28/03/24	Thu 28/03/24	61
4.6.9	Preliminary design of LhARA diagnostic system	302 days	Wed 01/02/23	Thu 28/03/24	
4.6.10	M7: Preliminary design of LhARA diagnostic system complete	0 days	Thu 28/03/24	Thu 28/03/24	63
4.6.11	Preliminary design of LhARA control and feedback systems	129 days	Mon 02/10/23	Thu 28/03/24	
4.6.12	M8: Preliminary design of LhARA control and feedback systems complete	0 days	Thu 28/03/24	Thu 28/03/24	64
4.6.13	Finalise Conceptual Design iterations (All LhARA systems)	80 days	Thu 04/04/24	Wed 24/07/24	
4.6.14	M17: Finalise Conceptual Design iterations (All LhARA systems) complete	0 days	Wed 24/07/24	Wed 24/07/24	67
5	**WP2 ITRF Facilities & Costing**	**302 days**	**Wed 01/02/23**	**Thu 28/03/24**	
5.1	Preliminary design study of bulk shielding, beam dump and radioprotection requirements	302 days	Wed 01/02/23	Thu 28/03/24	
5.2	M9: Preliminary design study of LhARA bulk shielding, beam dump and radioprotection requirements complete	0 days	Thu 28/03/24	Thu 28/03/24	70
5.3	Mechanical design of accelerator systems & integration	302 days	Wed 01/02/23	Thu 28/03/24	
5.4	M10: Mechanical design of LhARA accelerator systems & integration complete	0 days	Thu 28/03/24	Thu 28/03/24	72
5.5	Preliminary design of the building and infrastructure requirements	129 days	Mon 02/10/23	Thu 28/03/24	
5.6	M11: Preliminary design of LhARA building and infrastructure requirements complete	0 days	Thu 28/03/24	Thu 28/03/24	74
5.7	LhARA vacuum systems specifcation	129 days	Mon 02/10/23	Thu 28/03/24	
5.8	M12: Finalise LhARA vacuum systems specifcation	0 days	Thu 28/03/24	Thu 28/03/24	76
5.9	Preliminary design of the mechanical supports including the vertical arc	129 days	Mon 02/10/23	Thu 28/03/24	
5.10	M13: Preliminary design of LhARA mechanical supports including the vertical arc complete	0 days	Thu 28/03/24	Thu 28/03/24	78
5.11	Estimation of LhARA power consumption and cooling requirements	129 days	Mon 02/10/23	Thu 28/03/24	
5.12	M14: Estimation of LhARA power consumption and cooling requirements complete	0 days	Thu 28/03/24	Thu 28/03/24	80



Resources

LhARA resource 3.36 SY
Conventional resource 0.14 SY
Overall 3.5 SY

+ £50k for a radiation shielding study

			October 2022 start assumed		September 2024 finish assumed
			FY22-23	FY23-24	FY24-25
ITRF Preliminary activity					
		Total (SY)			
	STFC activity lead, Group, Department.				
WP2 Facilities & Costing					
Work Package Management	N Bliss, PQM, Technology (Temp.)	0.500	0.125	0.250	0.125
Mechanical engineering design specification	C Hill, P&ME (DL), Technology	1.200	0.300	0.600	0.300
Electrical engineering design specification	S Griffiths, EE, Technology	0.650	0.100	0.450	0.100
Controls specification	G Cox, CS&SI, Technology	0.350	0.050	0.250	0.050
Technical services specification	R Buckley, BP&F, ASTeC	0.450	0.050	0.350	0.050
Vacuum specification	A Vick, VS, ASTeC	0.250	0.050	0.150	0.050
Radiation protection specfication	A Goulden, BP&F, ASTeC	0.100	0.015	0.070	0.015
WP2 Staff Total		**3.500**	**0.690**	**2.120**	**0.690**

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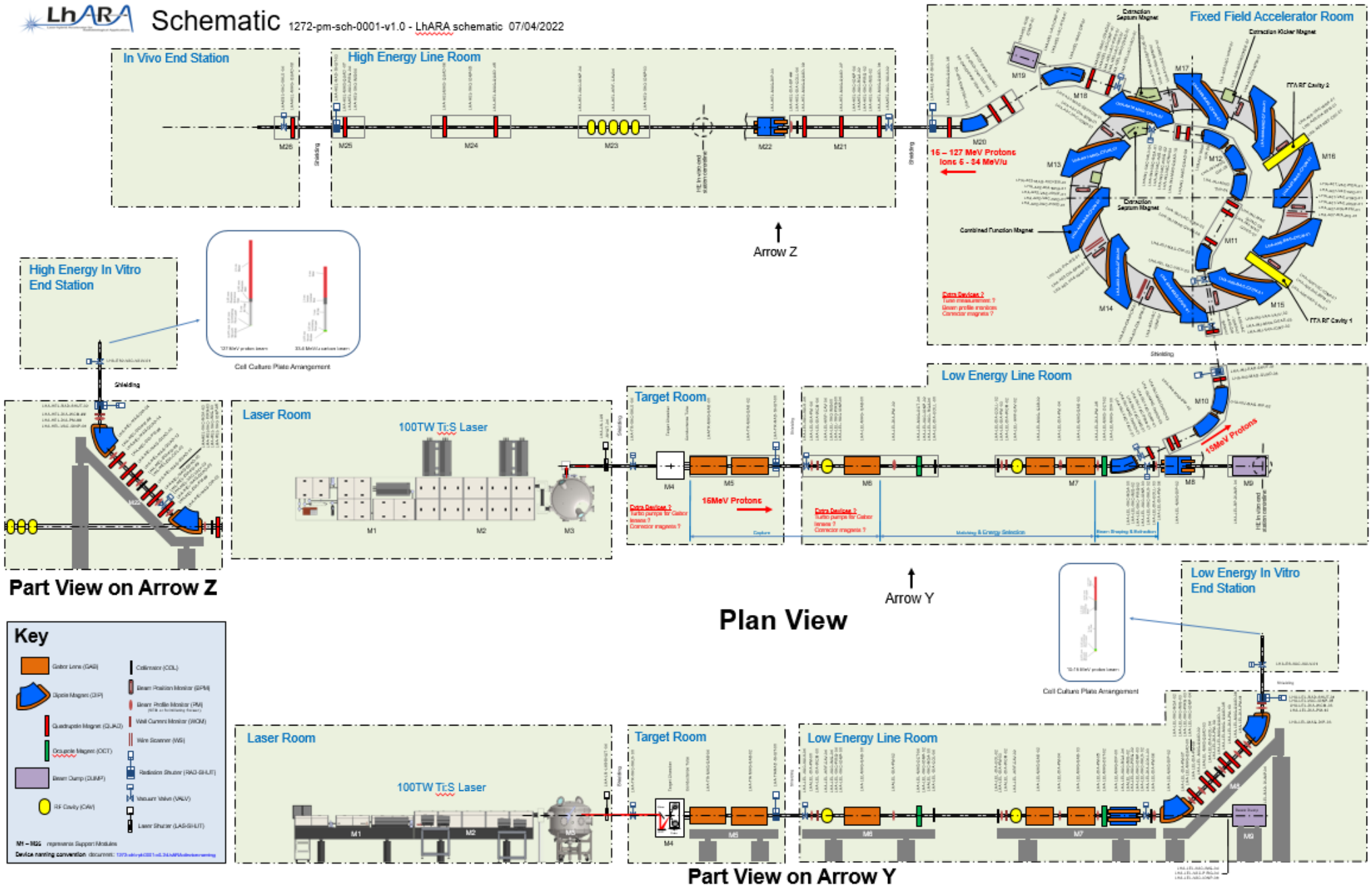
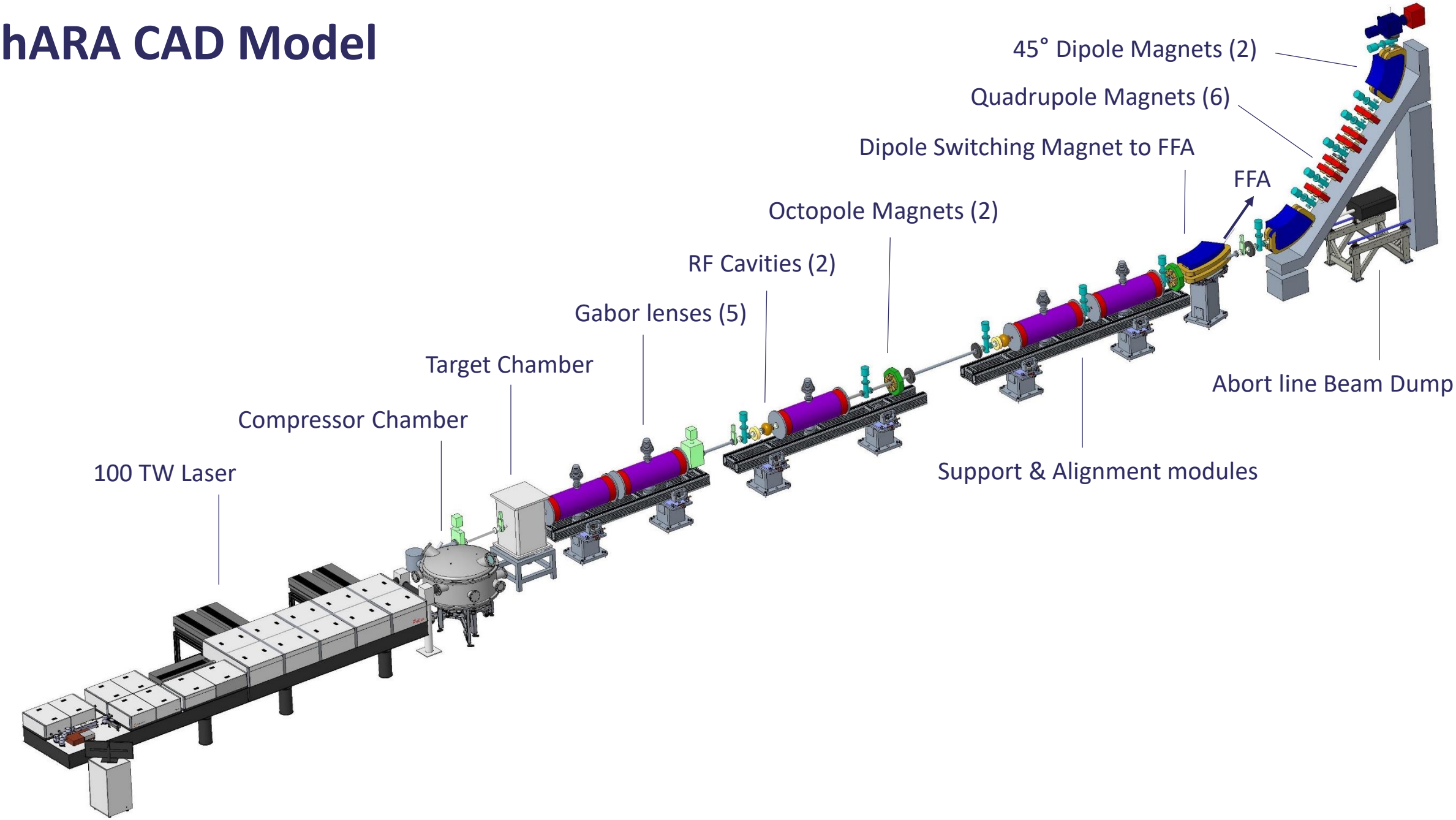
Document: 1272-pa1-pm-sch-0001-v1.0-LhARA schematic

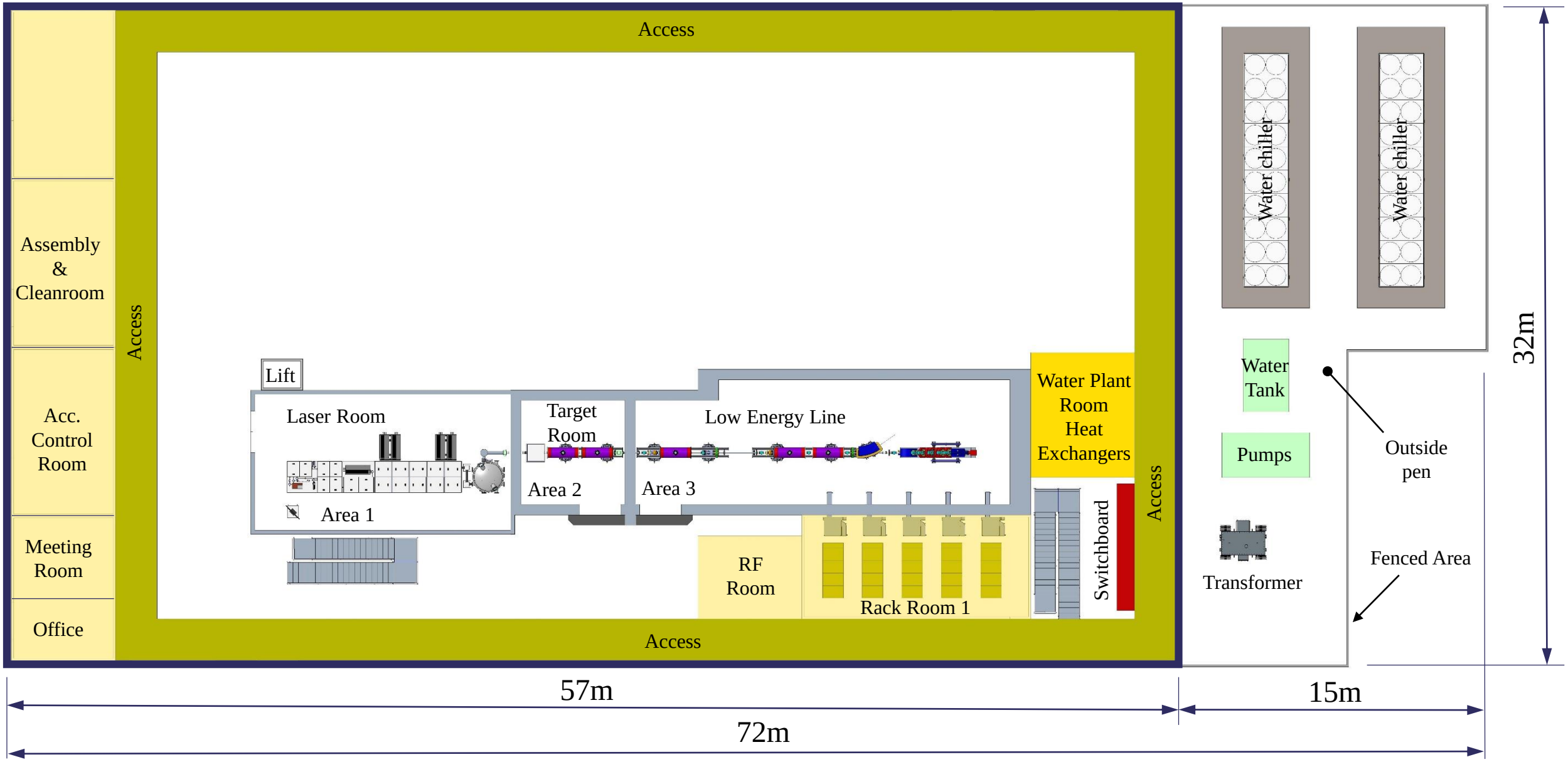
https://stfc365.sharepoint.com/sites/ITRF



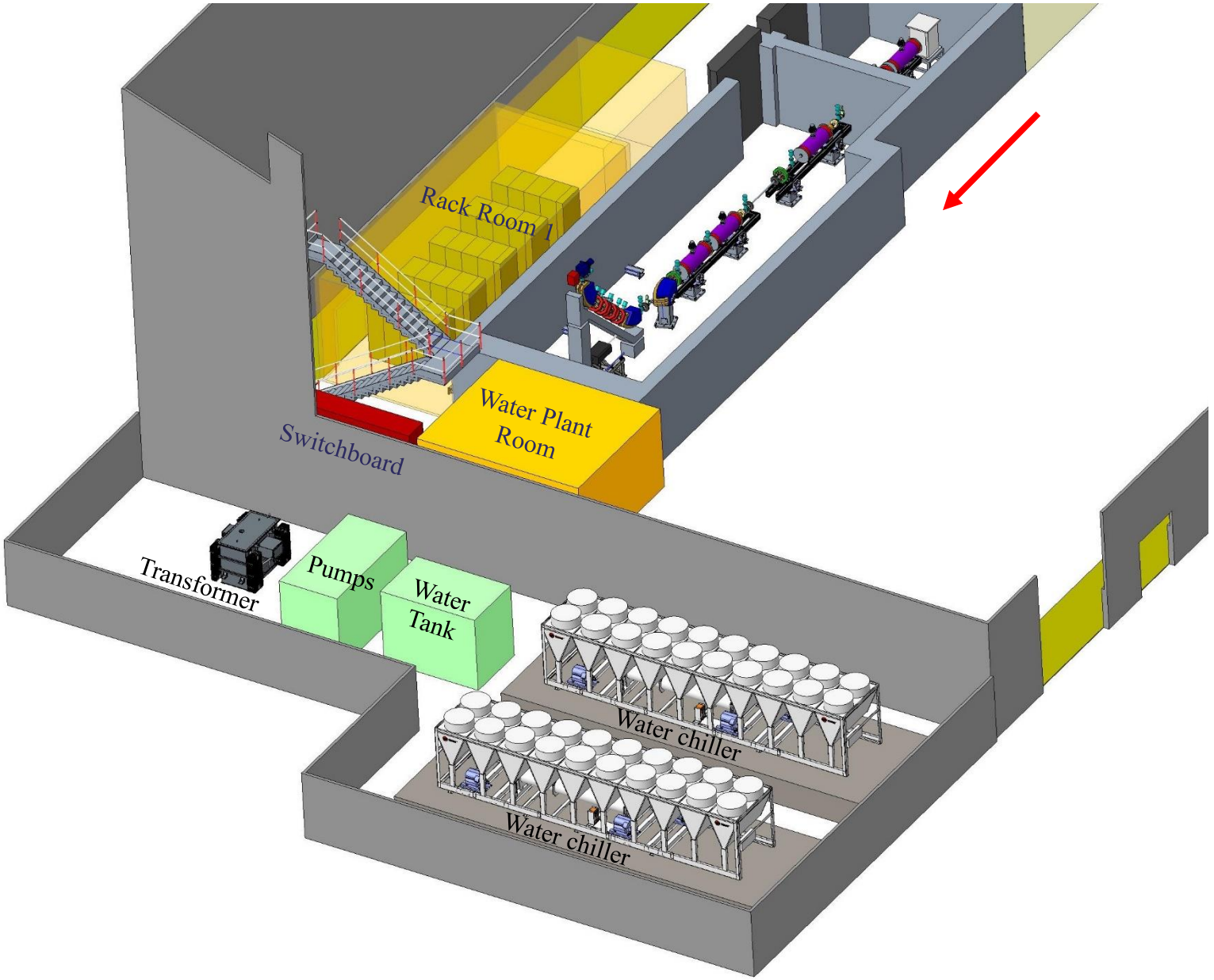
LhARA CAD Model



Plan View Layout of Facility – Stage 1



Water Chillers, Pumping and Transformer pen



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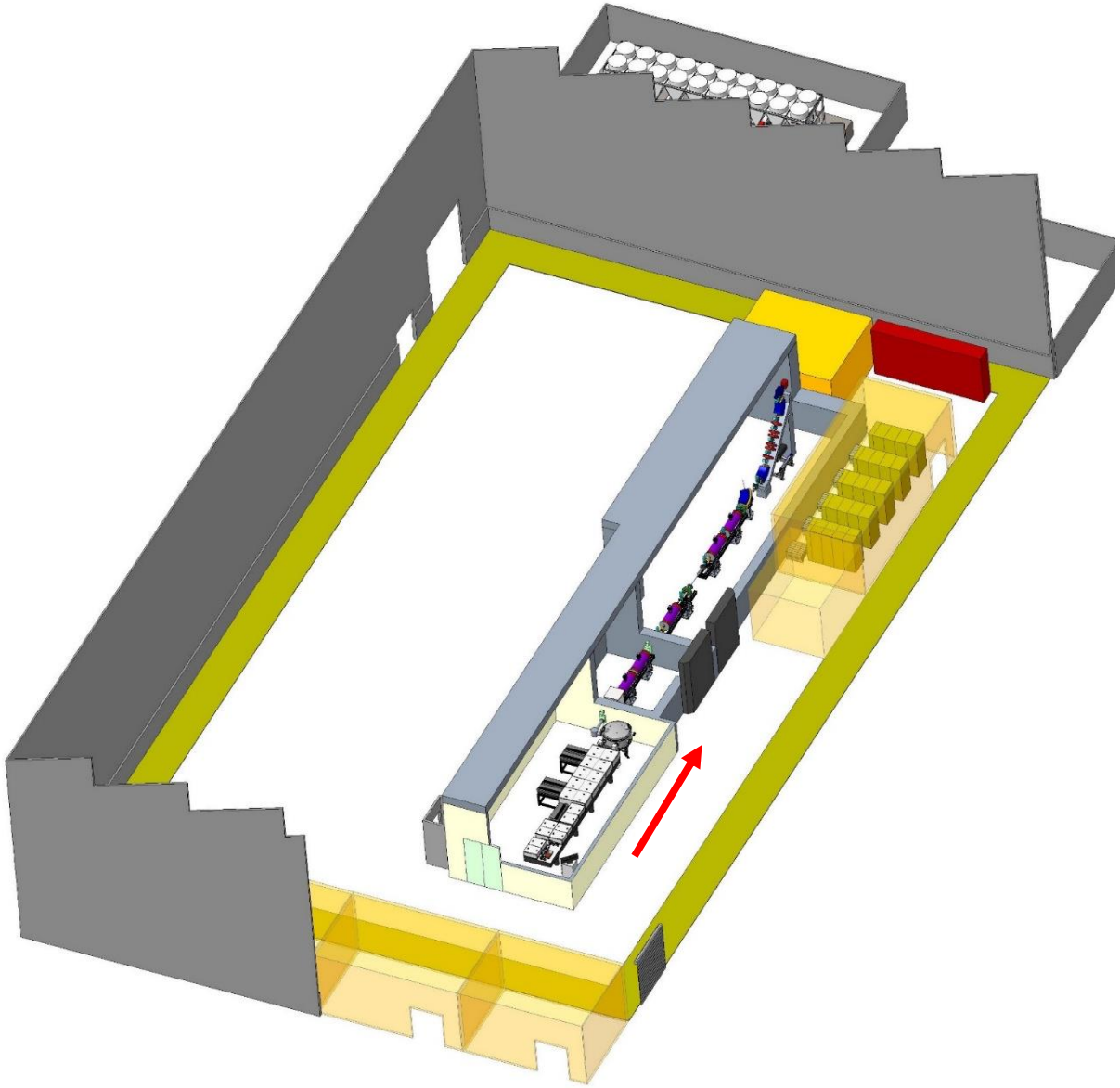
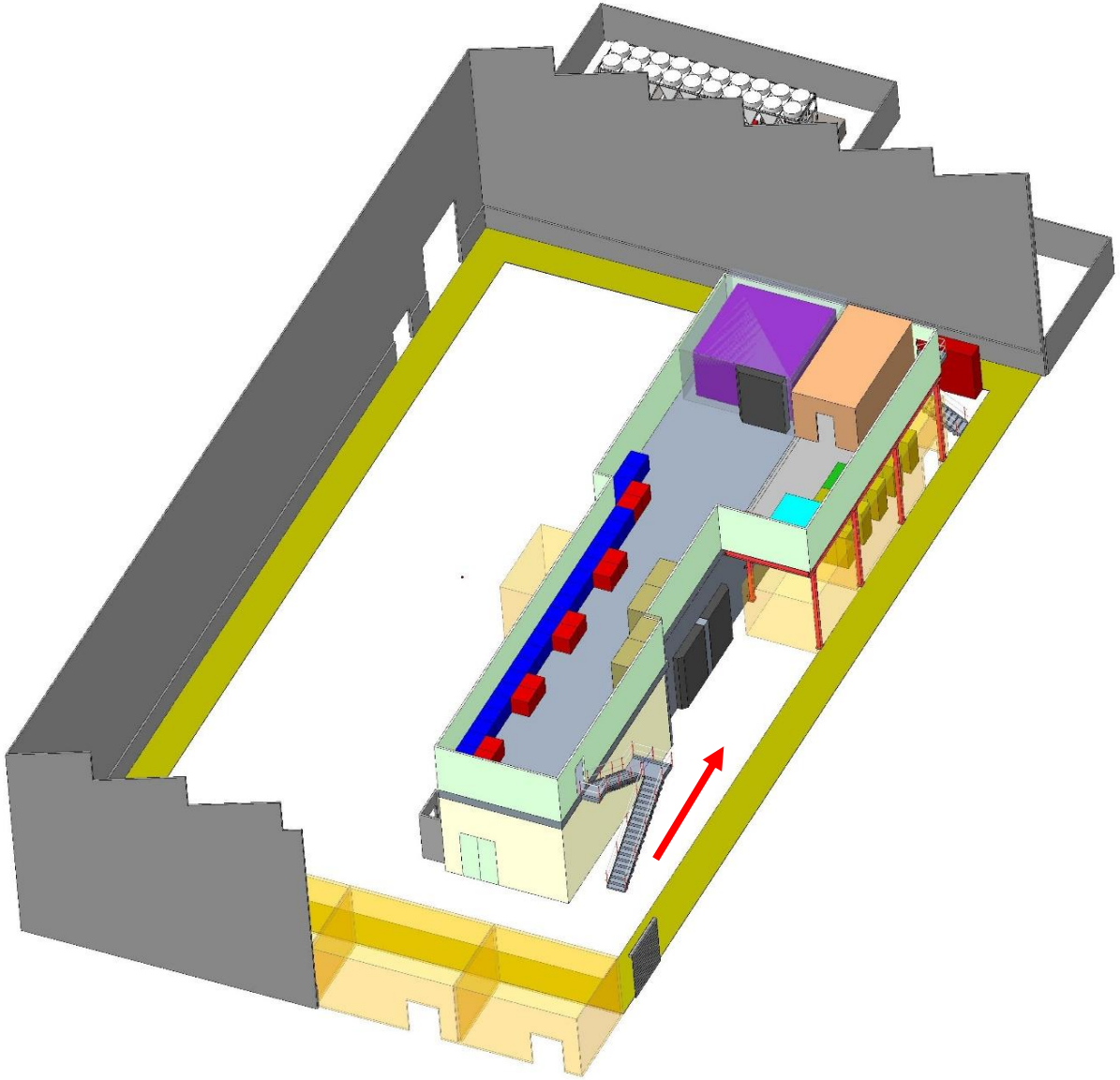
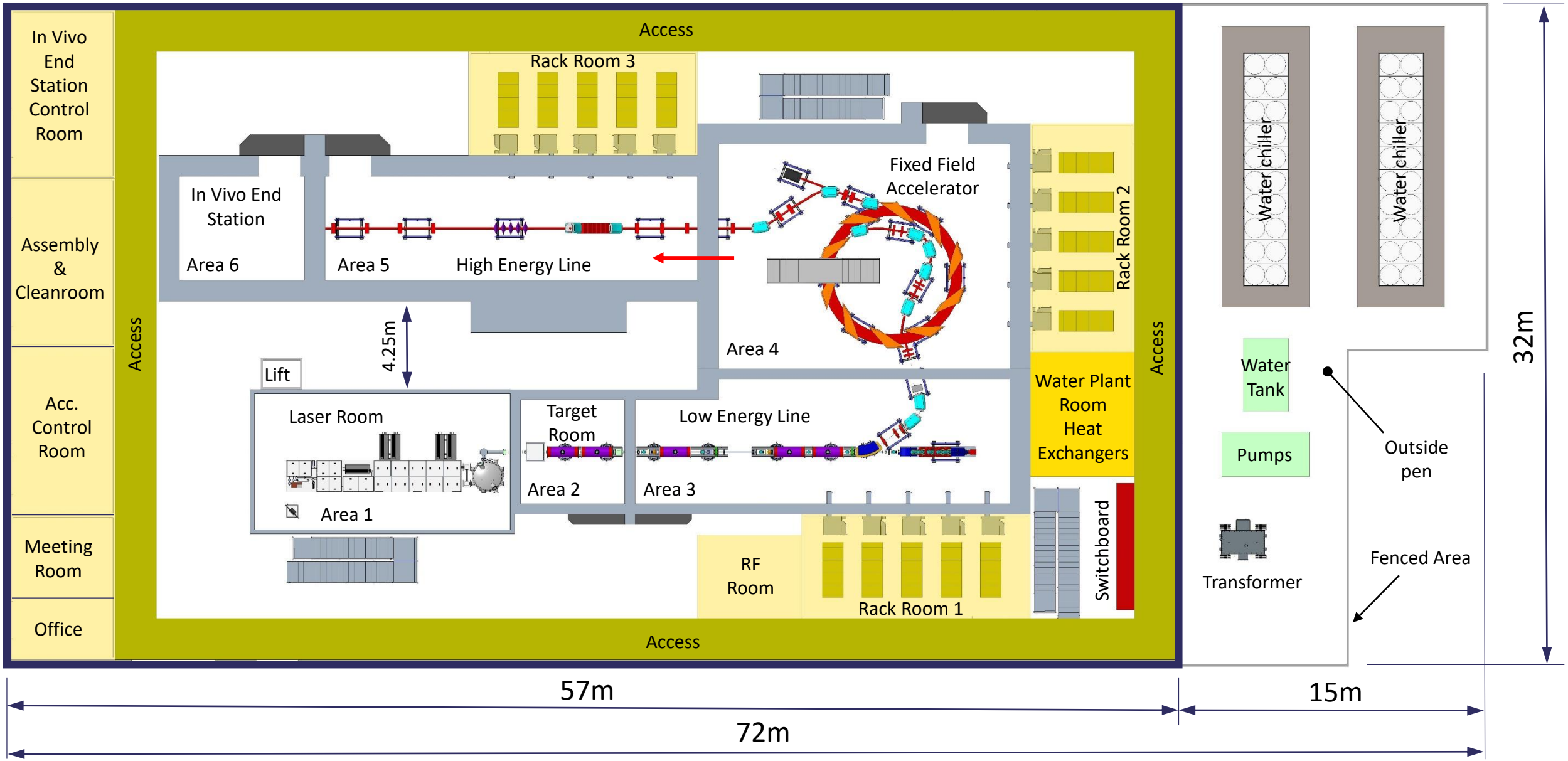
Stage 1 Building Concept

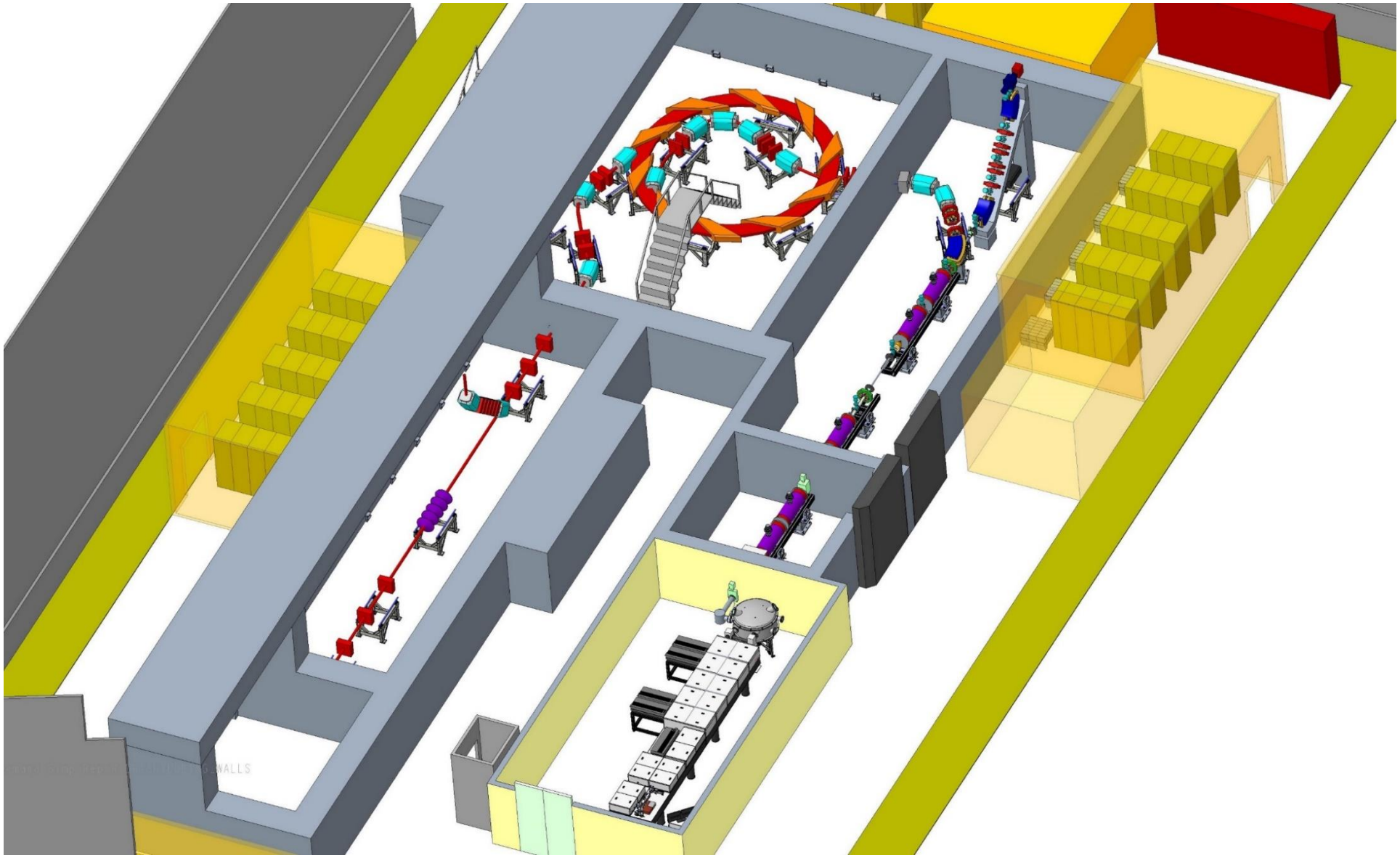


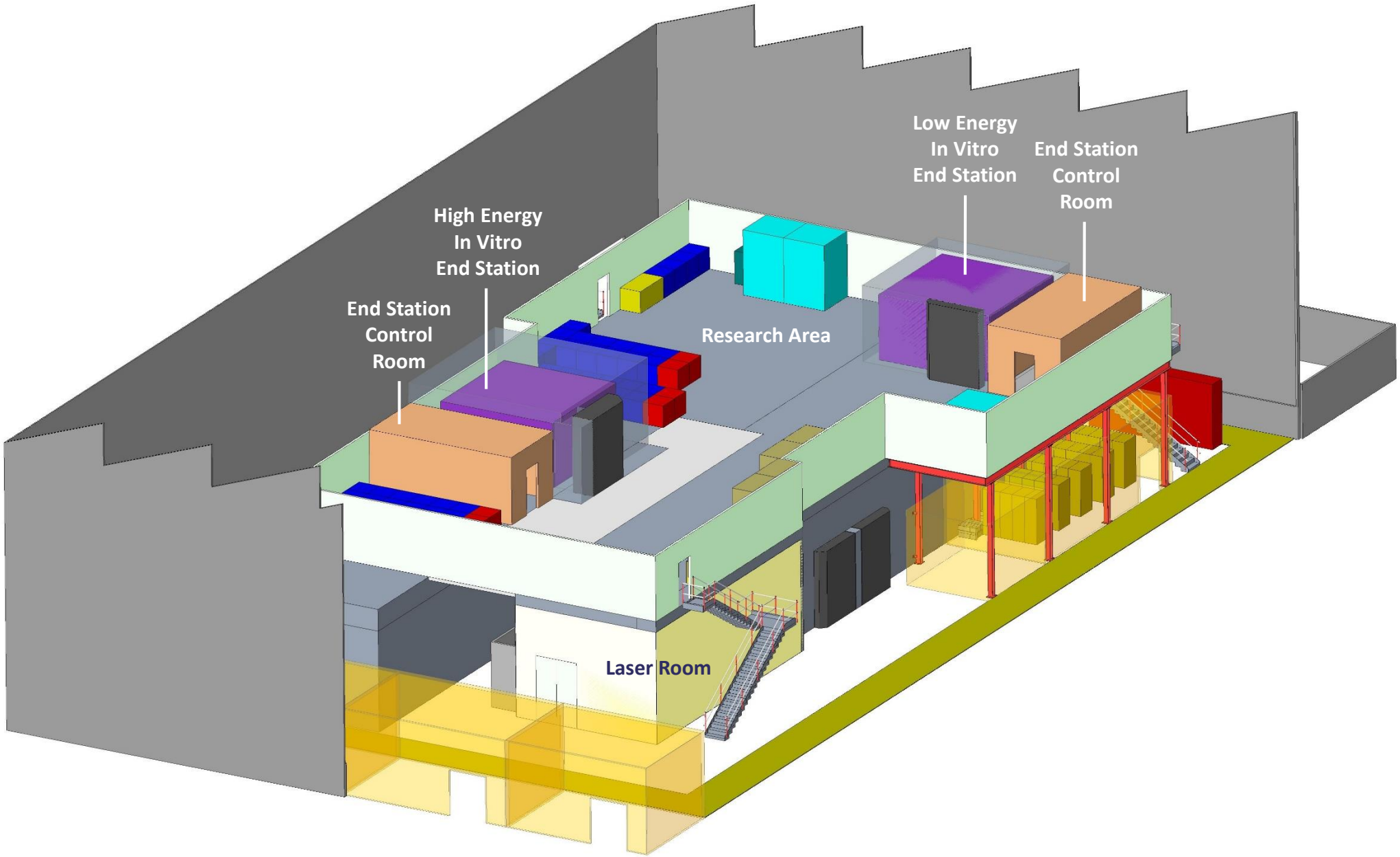


Plan View Layout of Facility – Stage 2

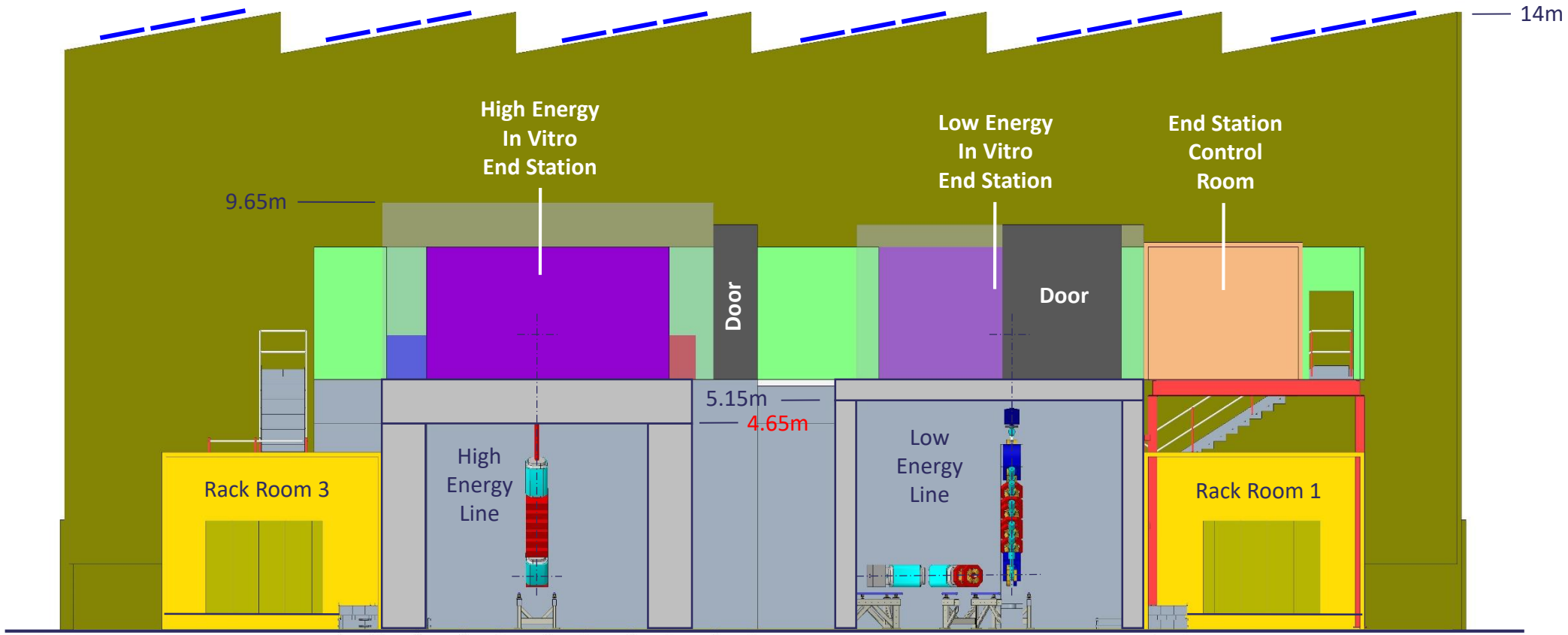


Building Concept Design with cutaway to show equipment




Low Energy
In Vitro
End Station
End Station
Control
Room
High Energy
In Vitro
End Station
End Station
Control
Room
Research Area
Laser Room

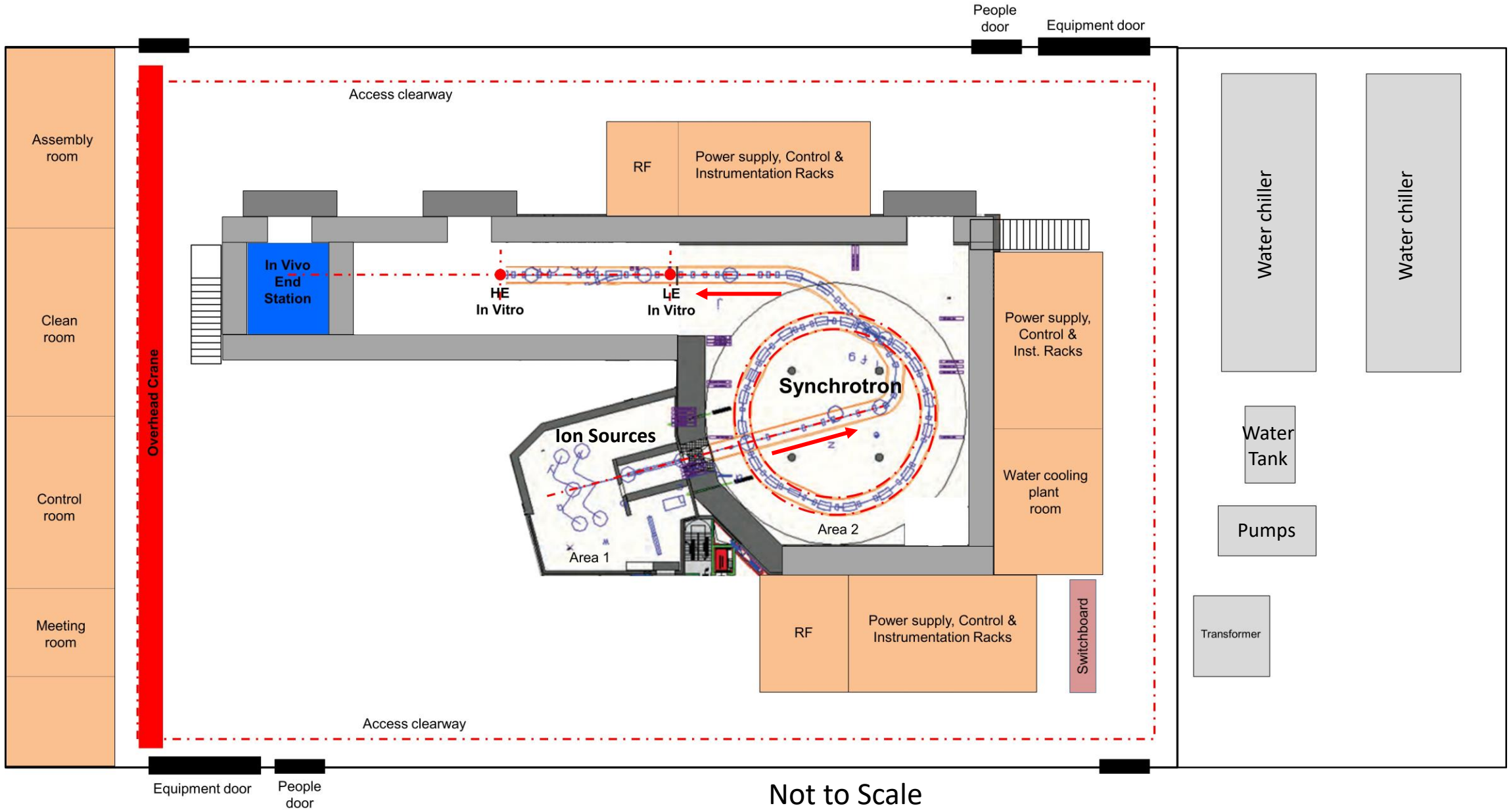
Cross section through building



Radiation Shielding Study by TUV SUD (Nuclear Technologies, Birchwood)

- A high-level shielding design basis report that creates a point of reference for all shielding & radiation protection calculations
- Radiological Classification of Areas
- Preliminary Bulk Shielding Requirements
- Concrete Sustainability Appraisal

ITRF Building Concept (Synchrotron based on MedAustron)



Not to Scale

Costing

- References
  - Pre CDR costing
  - Accelerator cost studies performed by DL staff
  - Recent accelerator build costs (ASTeC RTF & Commercial activities)
  - Recent building construction at RAL
- Significant increase in costs recently associated to Brexit, Energy costs, Material and Component availability.
- Allowance in TDR phase for Sustainability studies
  - Pre CDR
  - Accelerator studies performed by DL staff
  - Recent building construction at RAL

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