SPORT ENGLAND

Creating sporting opportunities in every community

Affordable Community Swimming Pools

the asa

Contains essential reference material for the efficient delivery of affordable and financially sustainable swimming pools.

Executive Summary

This innovative study has been produced by Sport England to help project teams develop a 25 m community swimming pool. It comprises a set of reference tools which can reduce the need for some of the traditional feasibility studies and help achieve affordable and sustainable swimming pool provision more efficiently.

The information can be applicable to a standalone solution or a building block within a bigger development. The project team could seek to increase the range of commercial leisure opportunities associated within the development to improve overall financial sustainability or expand the facilities with further 'bolt-ons' to create a multi-sport venue.

Swimming is one of the nation's most popular physical activities that can be enjoyed by people of all ages and abilities. It is recognised as being uniquely beneficial to the nation's health and well-being and is ideally suited to people with disabilities and the elderly or infirm who might have difficulties with other forms of exercise. Swimming and water safety are essential life skills. As part of the National Curriculum it is regarded as an essential part of children's education ensuring safe enjoyment of water activities and the wider environment. The provision of new swimming pools plays a significant part in Asset Based Community Development and Regeneration, increasing participation and reversing the need for subsidy support for aging facilities.

Swimming pool buildings are complex to develop, construct, maintain and operate. Sophisticated systems are necessary to maintain safe water quality and environmental conditions.

Skilled staff are required to manage swimming pools safely and successfully and ensure economic, social and environmental sustainability. Alongside experienced project managers, designers and building contractors, an informed client team is imperative to the successful delivery of a new swimming pool.

The reference tools can give a better understanding of the implications of developing swimming pools and the opportunities that exist to ensure the process of commissioning is comparatively de-risked. They cover design, operational and procurement issues and although aimed mainly as a pre-planning model they can be used at all stages of the procurement to ensure compliance with best practice. With the engagement of the appropriate delivery partners, they can be read as a pre-approved building that will be open for use significantly more quickly than if using traditional routes of delivery.

The team who developed this study includes swimming pool users, key stakeholders and a range of experts from the leisure, design and construction industry. There are options for 4, 5, 6 and 8 lane versions and alternative layouts for the associated changing support facilities and a secondary pool.

The reference tools help to deliver on the following core aspirations:

- A swimming pool that is attractive, safe and secure, accessible by all members of the community, suitable for family based activities and gives opportunities for people to improve their personal skills and abilities.
- An affordable facility and model operational plan that will increase sports and leisure participation, create employment opportunities, increase community involvement, and play a part in reducing anti-social behaviour.
- A building that considers the need for environmental sustainability.
- A model operation plan that can acheive financial sustainability.

There is a strong demand for swimming pools of this size and scale throughout England, and the use of this pre-approved model will, upon delivery, ensure increasing participation in a facility that meets expectations of all stakeholders.

The base construction costs range from £2.1 m to £4.0 m [1].

The operating budgets can create a surplus of circa £24 k / year [2].

A new swimming pool can be opened within 24 months of the decision to proceed.

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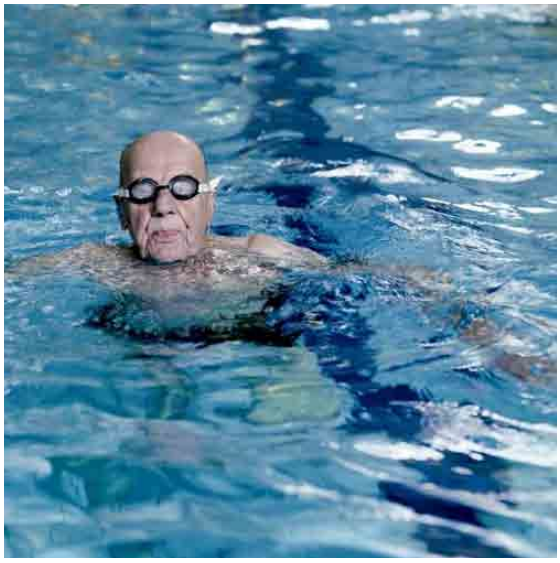
[1] See capital costs overview page 15.

[2] Subject to pricing, programme and operating assumptions.

Contents



Introduction

Purpose of document

The purpose of this study is to provide a set of reference tools with key information to support the decision making processes for new swimming pool projects with a particular focus on affordability and future financial sustainability.

It is based on a range of indicative designs that are tightly planned, functionally efficient and accommodated within an economical building structure that can be quickly constructed. They are compliant with Sport England guidance and current industry standards and provide options for 4, 5, 6 and 8 lane swimming pools and secondary pools. They also allow the flexibility for adjustment to individual site situations and at the same time create elegantly designed swimming environments to promote high levels of customer appeal.

The accompanying cost, specification and procurement information shows how a new swimming pool building can be efficiently delivered and how it can operate on a break even basis and achieve lasting financial sustainability.

The study is intended to be a supporting reference tool and is not intended to replace the services of an Architect and the specialist supporting consultants that will be required to properly develop the feasibility studies, business model, design and operational plan for a particular site.

The study addresses the requirements of the Amateur Swimming Association (ASA), Sport England, current Building Regulations and other statutory bodies. Consultation with leisure operators has ensured that commercial matters have been addressed to provide a financially sustainable development. The delivery of 25 m pools supports the ASA strategic vision of a network of accessible and affordable swimming pools, which have no barriers to participation or developing local talent.

Select a project team with good previous experience of swimming pool projects.

Strategic Planning

There are many permutations for community swimming pools ranging from 4 lane to 8 lane pools which may also be combined with a secondary pool. In addition the pools may be enhanced by the installation of movable floors and booms. More water space and greater flexibility through the use of booms and movable floors is very desirable. However these come with a significant increase in both capital and running costs. It is therefore critical for the success of any pool project that the project brief is based on clearly articulated needs and a strong evidence base.

A clear understanding of what is required is crucial to the long term success of any pool project and it is important that the project is developed in a consistent and logical way. Sport England and the ASA are finalising a *'Developing the Right Swimming Pool'* document that should be followed for every pool project. The recommended key steps are set out below:

The 7 Step Process

1

SUPPLY AND DEMAND ISSUES

Identify the issues of supply and demand that need to be addressed by any proposals for modernising or building new pools.

(For example this will include the age and condition of existing pools as well as any plans for new pools, areas of housing growth or significant population change.)

2

STRATEGIC CONSIDERATIONS

Identify if the site or sites are a priority for swimming provision or other complementary activity in local plans or strategies.

(For example are there proposals for new sports halls, schools or health facilities?)

3

TYPE, LEVEL AND AMOUNT OF ACTIVITY

Identify the types of activities e.g. competition, training; the level of use such as community use, regional club use; and how much time and space will be needed.

(It is important that the ASA are fully involved at this step to advise on the requirements for club and performance swimming and other aquatic disciplines.)

4

DEVELOPING AND REVIEWING THE OPTIONS

Develop and review the different options that will meet the future aquatic needs of the area.

(For example this might include refurbishing existing pools, the number and location of pools and the role of other providers.)

5

DEVELOPING THE PROJECT BRIEF

The project team will develop the selected option from high level requirements into a project brief that defines what is needed: the amount of water space, number of pools and use of movable floors and booms etc.

6

THE BUSINESS CASE / VALUE FOR MONEY APPRAISAL

This step brings together all the information collected, the decisions made and determines whether there is a viable sport and business case.

7

THE DECISION

At this step the decision is made either to proceed with an affordable and viable option or go back to an earlier step and review the requirements / identify an alternative solution.

Architectural Design

Design approach

The indicative design options are based on the use of a simple, compact and functional building geometry in the interests of economy and flexibility.

A low profile mono-pitch or double-pitch frame structure is used that can be extended outwards to accommodate elements such as the entrance and the secondary pool or propped in areas where smaller spans or overhead plant are required.

This leads to a simple, compact and functional 'linear' building form that can be widened and lengthened to accommodate the various sizes of swimming pool that are considered. For maximum efficiency and economy the main plant room space is located adjacent to the deep end of the swimming pool tank and a secondary plant space over the changing rooms. For reasons of safety and easy supervision, the changing areas are adjacent to the shallow end and the entrance and reception have viewing into the pool hall. The changing room layouts vary to suit the water area, width of building and programe of use.

Spectator accommodation is directly accessed from the entrance and reception area.

Wall glazing and a sensitive 'architectural treatment' are used to give 'prominence' to the entrance of the building and to create a 'shop window' for the activities inside.

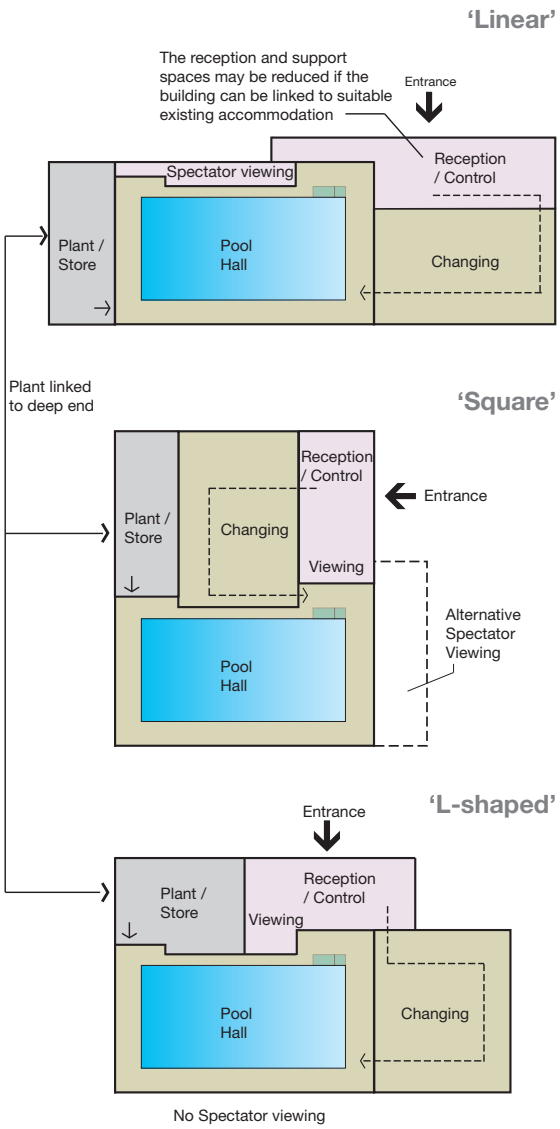
Alternative building configurations

There are a number of ways that the building may be configured to suit particular site constraints or particular building techniques. For example, the 'Linear' form that is illustrated later in this document could also be configured in a 'Square' or an 'L' plan form, with a similar building footprint area. However, a number of critical inter-relationshps between the main elements of the building should be maintained.

These include:

- Entrance easily identifiable
- Reception and control well located to provide direct access to the changing rooms and viewing areas
- Changing area feeding into the shallow end of the swimming pool
- Plant room being adjacent to the deep end of the swimming pool.

See Sport England's 'Swimming Pools' Design Guidance Note for further details.



Location

The designs have been developed to have the flexibility to fit on a wide range of sites or be an extension to an existing building. The particular characteristics and constraints of each individual site will need to be established. For example:

- Access
- Locations of services
- Orientation
- Landscape and townscape issues
- Geotechnical conditions.

All key factors should be carefully considered in order to sensitively 'tailor' the design for the particular location. This should include discussion and consultation with local Stakeholders and Planning Departments and all other work associated with RIBA Stage D (Scheme Design and Planning) [3].

See pages 9-13 for detailed illustrations of the 6 lane designs with and without a secondary pool and Appendix 1 for alternative 4, 5 and 8 lane options.

The 6 lane swimming pool configurations are most likely to be operated on a 'break even' basis and be suitable for many locations.

Accommodation provided in the 6 lane option

Internal

The internal space within the building comprises the following key spaces:

- The main entrance equipped with draught lobby, foyer and main reception area including self entry machines, reception desk, office accommodation and store, vending area, buggy store, access to changing rooms via turnstiles, unisex accessible toilet and access to informal viewing areas.
- Dry side viewing area with access to temporary pool side informal viewing.
- Pool hall with 25 m x 6 lane pool tank with water depth grading from 0.9 m to 1.8 m deep, easy access steps, pool lift and pool steps, pool side seating for pool users.
- Pool store accessible from the pool surround.
- Changing village including:
  - double changing cubicles
  - accessible / family / group changing cubicles
  - unisex "Changing Places" accessible changing room

View of pool hall (from the deep end)

[3] Plan of work consisting of key project stages recommended by the Royal Institute of British Architects (RIBA)

- unisex accessible changing room with shower and wc
- unisex accessible toilet
- separate male and female toilets
- baby change provision
- pre and post swim showers
- cleaners store
- lockers
- vanity area.

The provision is based on Appendix 3 of the Sport England Design Guidance Note 'Swimming Pools' and the predicted peak numbers of users for the programme for each scheme (see pages 17 - 22). The total areas of changing and sanitary provision are broadly similar to that of the pool water for each scheme (see area ratios in Appendix 6). Double cubicles are used to maximise the spatial efficiency and allow a more generous amount of space per person during non peak periods. A flexible zone of family / wheelchair / group changing rooms is also provided to efficiently allow for a wide range of user groups.

The indicative changing room layouts should be reviewed against the proposed programme and operating model in the project brief for each individual site.

- First aid room with accessible toilet, accessed from both the pool surround and from outside.
- Plant room in a fire resisting enclosure with areas for boilers, combined heat and power (CHP), thermal store, water treatment and electrical switch gear.
- Air handling plant located adjacent to the main plant room and over the changing rooms.

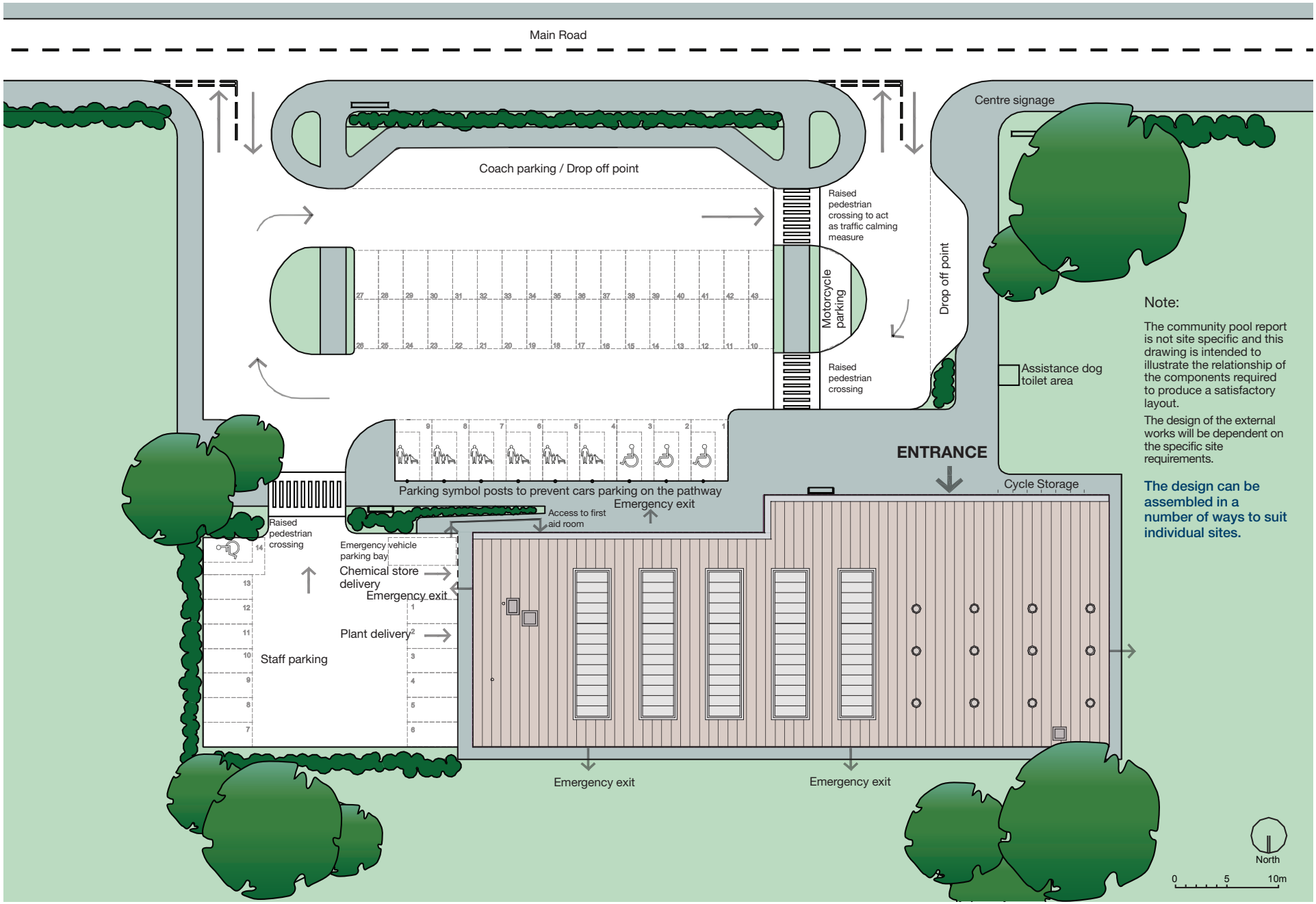
External

- Access road and car parking including accessible spaces, oversize family spaces, drop off point and motorcycle parking
- Coach parking and drop off
- Bicycle parking in covered area in view of reception area
- Facilities for assistance dogs
- External seating
- Service yard with facilities for chemical deliveries
- Hard and soft landscaping.

Carefully consider site factors to sensitively 'tailor' the design to the particular location and enhance the local environment.

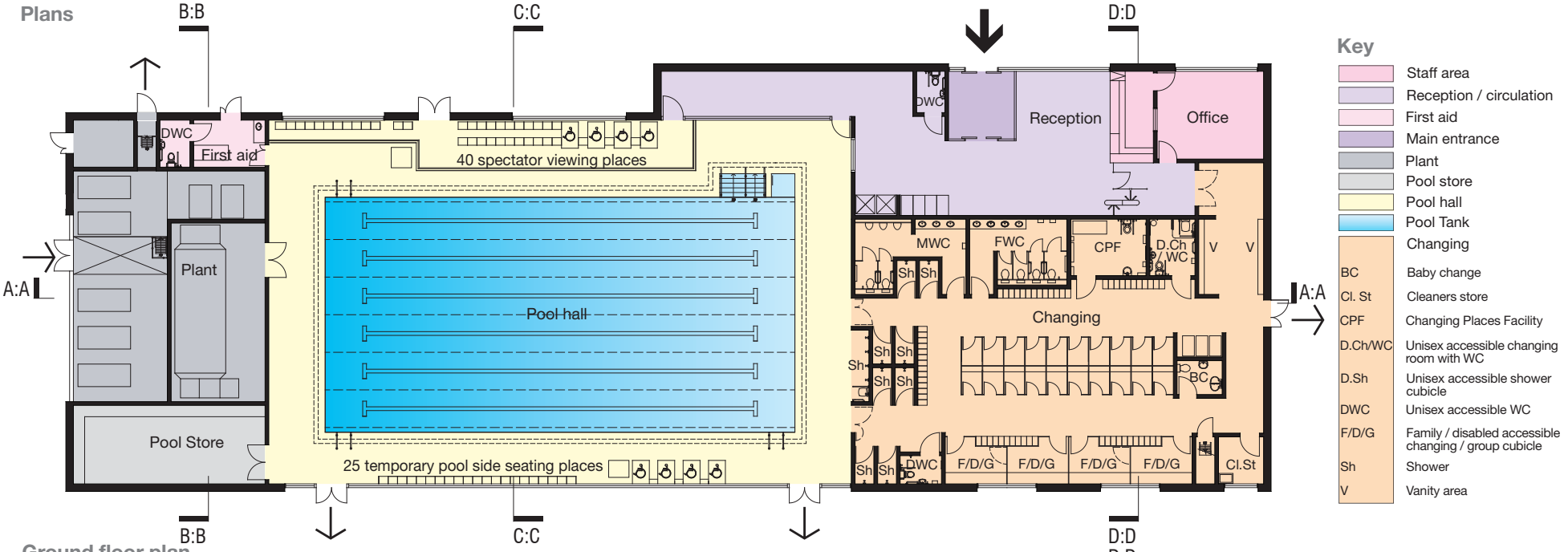
View of entrance with indicative landscaping

6 lane pool
Site plan

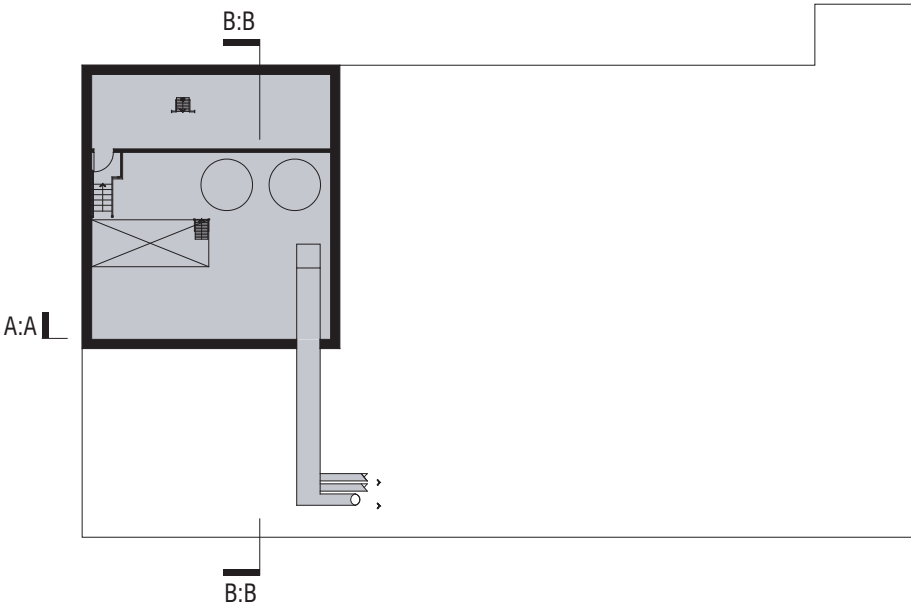


6 lane pool

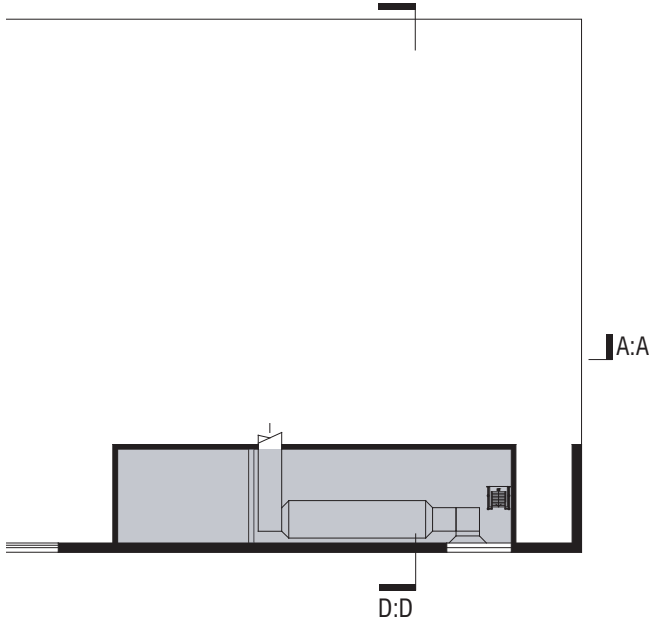
Plans



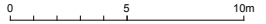
Ground floor plan



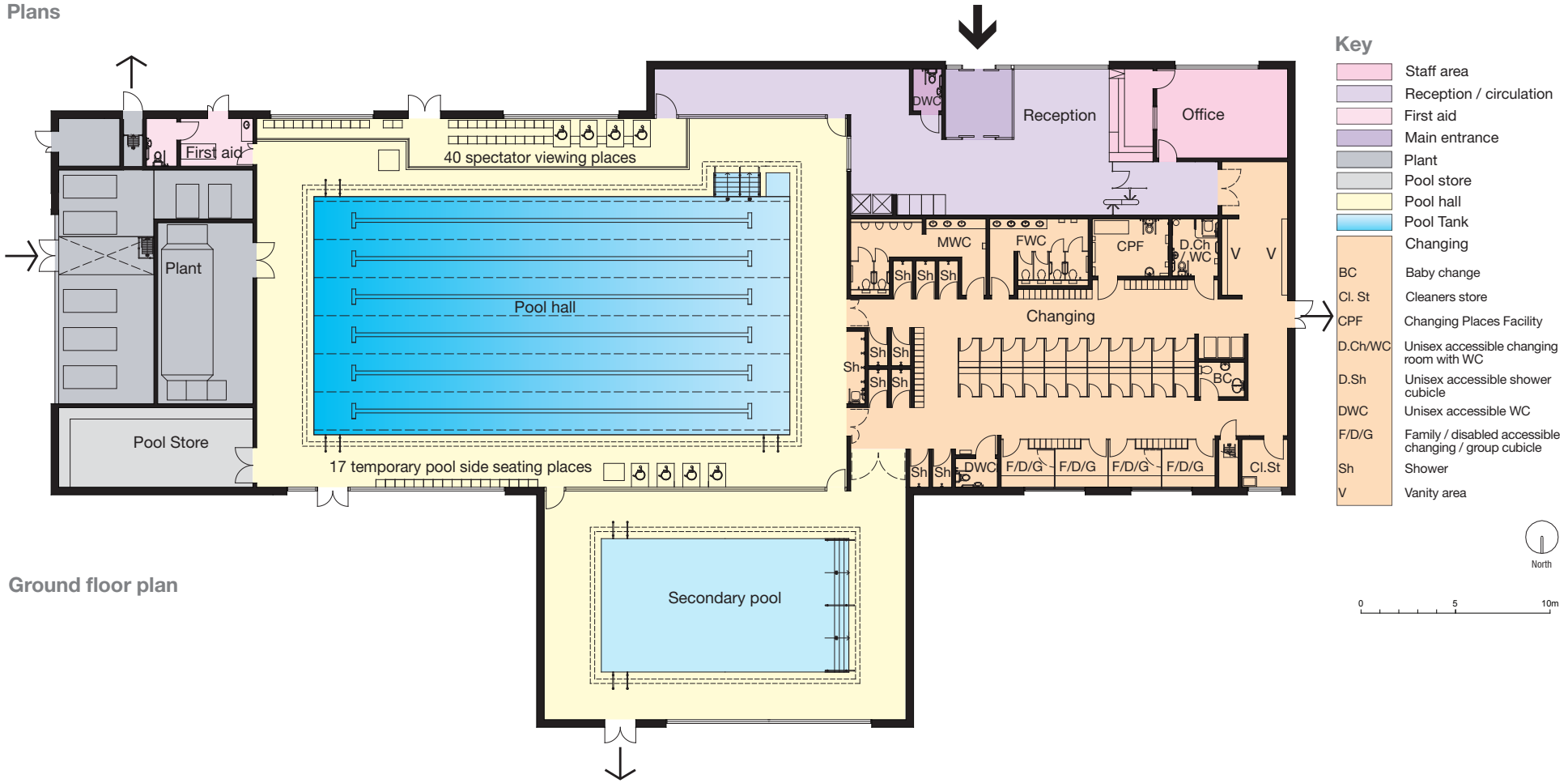
Basement plant level



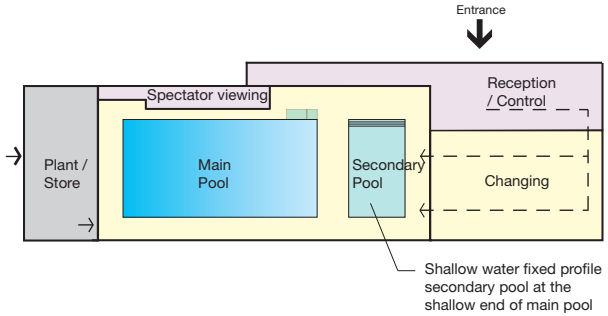
Mezzanine plant level



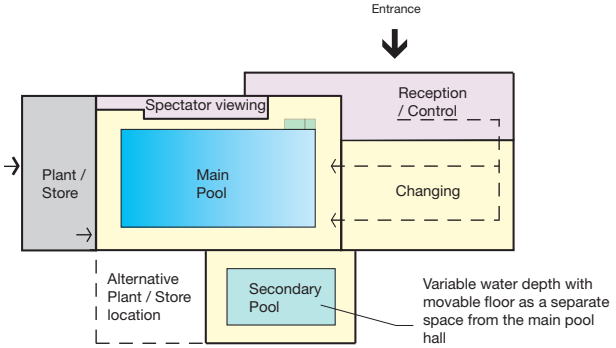
Plans



Ground floor plan



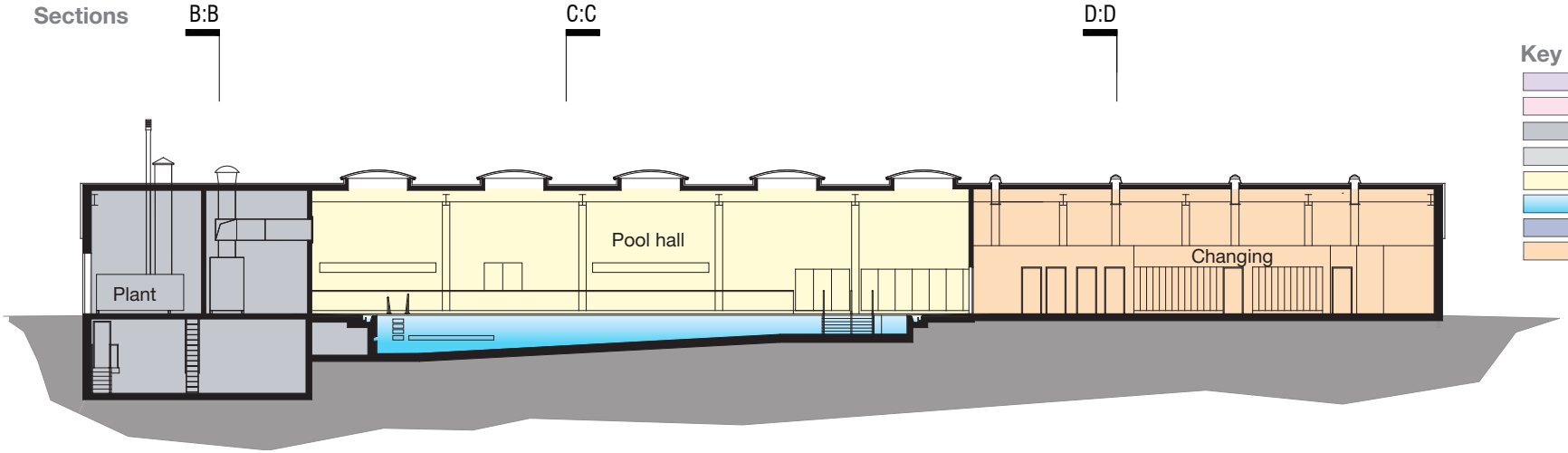
Alternative secondary pool location



Alternative secondary pool type

6 lane pool

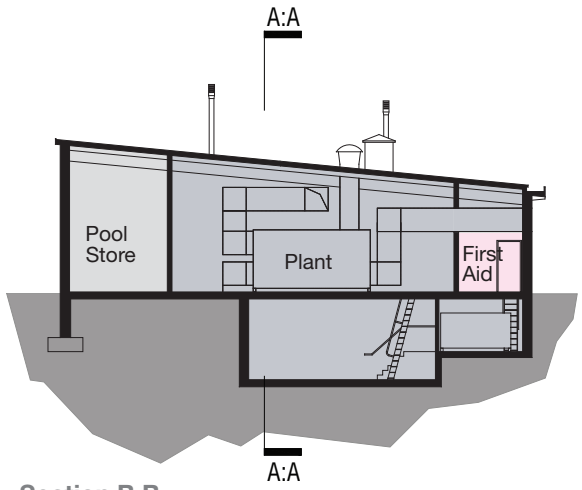
Sections



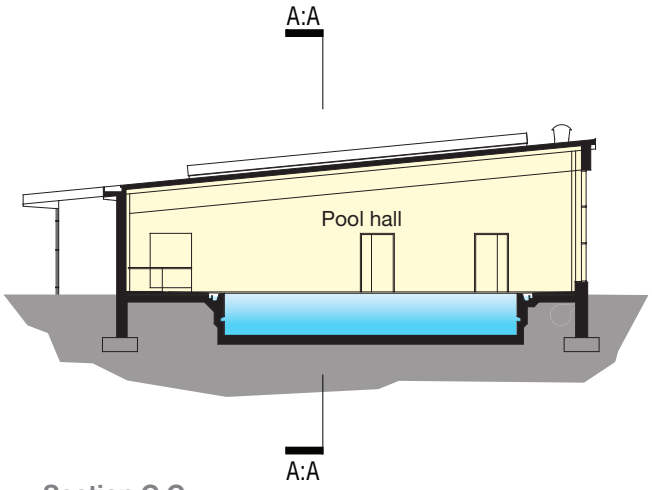
Key

- Reception / circulation
- First aid
- Plant
- Pool store
- Pool hall
- Pool Tank
- Soffit / applied ceiling
- Changing

Section A:A



Section B:B



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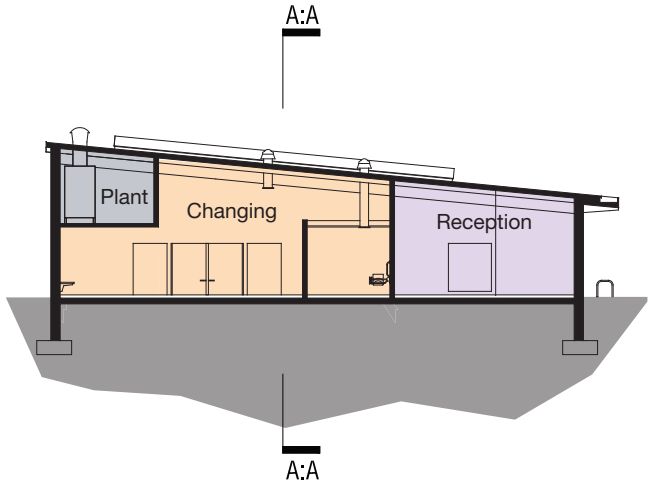
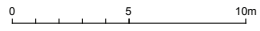
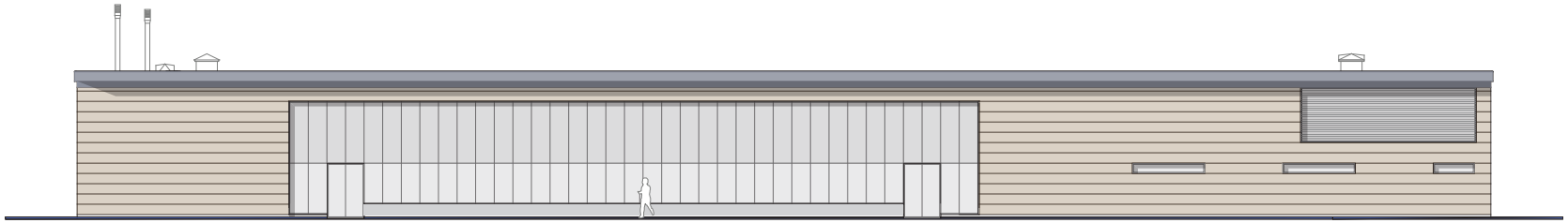


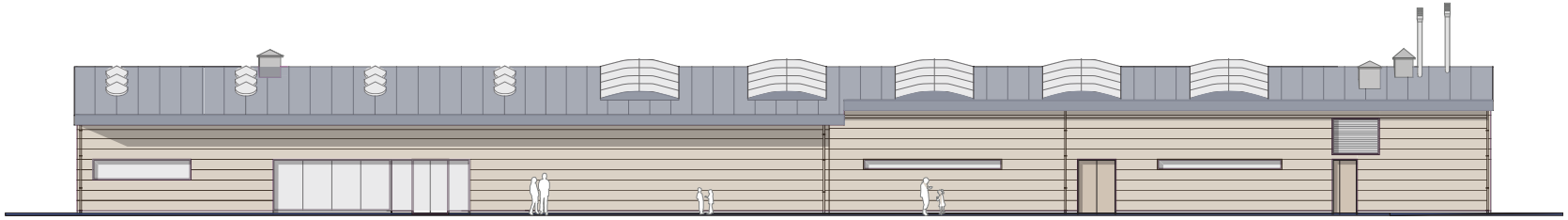
Section D:D



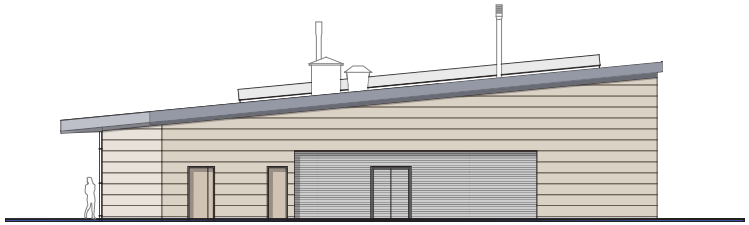
Elevations



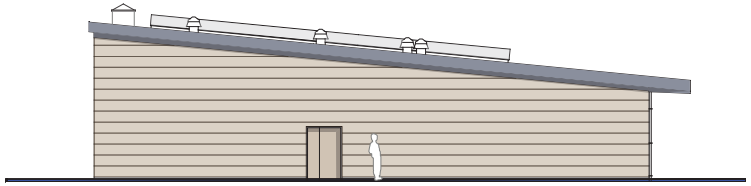
North elevation



South elevation



East elevation



West elevation

0 5 10m

Capital Costs

An overview of the capital costs of the project is given in the following table based on benchmark data and the area schedule. It includes the following main assumptions:

- Building costs at 3rd Qtr 2011
- VAT excluded
- Land acquisition costs excluded
- A green field site with no abnormal ground conditions
- The works are competitively tendered using a single stage Design and Build procurement route
- Drainage beyond the building footprint is site dependant and within 'Allowance for external works'
- Preliminaries are based on an unrestricted site with an 11 months construction period [4]
- Allowances included for systems and features within the building to assist in achieving the equivalent of BREEAM Very Good [5] for the project as a whole
- Alternative systems may also be required should natural gas not be available and to achieve Local Authority planning requirements for renewable energy. See separate table on page 16.

[4] The 11 month construction period is considered to be achievable for the 5 and 6 lane versions of the building, with the 4 and 8 lane options being 10 and 12 months respectively.

[5] The Building Research Establishment Environmental Assessment Method (BREEAM) includes leisure buildings. http://www.breeam.org/page.jsp?id=269

Capital costs[6] overview

Gross internal floor area (GIFA)		4 lane (£) (1084m²)	5 lane (£) (1344m²)	6 lane (£) (1529m²)	6 lane + secondary (£) (1850m²)	8 lane (£) (1878m²)	8 lane + secondary (£) (2226m²)
Elements of swimming pool building							
Substructure	Elemental total	223,000	260,000	284,000	375,000	358,000	381,000
Superstructure	Frame	147,000	175,000	187,000	220,000	230,000	254,000
	Upper floors	4,000	9,000	10,000	12,000	39,000	40,000
	Roof	131,000	202,000	230,000	255,000	280,000	358,000
	Stairs	14,000	14,000	14,000	14,000	16,000	19,000
	External walls	132,000	158,000	162,000	186,000	151,000	182,000
	Windows & external doors	58,000	60,000	61,000	61,000	61,000	61,000
	Internal walls & partitions	58,000	88,000	95,000	122,000	92,000	92,000
	Internal doors	19,000	22,000	21,000	23,000	22,000	22,000
	Elemental total	563,000	728,000	780,000	893,000	891,000	1,028,000
Internal finishes	Wall finishes	54,000	59,000	67,000	79,000	95,000	104,000
	Floor finishes	70,000	86,000	91,000	129,000	109,000	136,000
	Ceiling finishes	17,000	21,000	23,000	33,000	36,000	39,000
	Elemental total	141,000	166,000	181,000	241,000	240,000	279,000
Fittings	Elemental total	125,000	143,000	145,000	179,000	183,000	200,000
Services	Sanitary appliances	17,000	20,000	20,000	21,000	27,000	27,000
	Rainwater	5,000	6,000	7,000	9,000	9,000	11,000
	Below slab drainage	17,000	20,000	22,000	26,000	28,000	33,000
	M&E installations	517,000	664,000	742,000	942,000	956,000	1,166,000
	Specialist installations	170,000	209,000	240,000	282,000	277,000	345,000
	Builder's work in connection	73,000	92,000	104,000	128,000	130,000	159,000
	Elemental total	799,000	1,011,000	1,135,000	1,408,000	1,427,000	1,741,000
	Building sub-total	1,851,000	2,308,000	2,525,000	3,096,000	3,099,000	3,629,000
Preliminaries		257,100	286,200	290,500	302,000	322,000	332,600
BASE CONSTRUCTION COST		2,108,100	2,594,200	2,815,500	3,398,000	3,421,000	3,961,600
Additional costs	Contingencies (7½%)	158,200	194,600	211,200	254,900	256,600	297,200
	Professional fees (12½%)	283,300	348,600	378,400	456,700	459,700	532,400
	Allowance for external works (15%)	317,000	390,000	423,000	510,000	514,000	595,000
	Incoming services / stats	71,000	71,000	71,000	71,000	71,000	71,000
	Elemental total	829,500	1,004,200	1,083,600	1,292,600	1,301,300	1,495,600
OVERALL ESTIMATED PROJECT COST		2,937,600	3,598,400	3,899,100	4,690,600	4,722,300	5,457,200

[6] Based on building costs at 3rd Qtr 2011

Additional feature costs

Extra base construction indicative costs for optional features in an 8 lane pool with secondary pool

Description	Cost for additional pool hall features (£) (for 8 lane + secondary pool)
Additional seats to bring total to 150	94,000
Additional seats to bring total to 250	250,000
Addition of a moving floor to the 'secondary' pool to increase usage [7]	184,000
Addition of a moving floor with a flap to the main pool to give the option of shallow water for casual / teaching activities or deep water for competitions	323,000
Moving floor to main pool with vertical boom to increase programme flexibility	396,000

Extra base construction indicative costs for possible additional M&E features that may be required to achieve BREEAM Very Good for all pool options (over and above allowance already made for the building to assist in achieving BREEAM Very Good for the project as a whole)

Description	Indicative costs for possible additional M&E features (£) (for all pool options)
Rainwater harvesting	30,000 - 40,000
Photovoltaics	10,000 - 40,000
Solar Panels	14,000 - 45,000
Air Source Heat Pumps	10,000 - 50,000
Biomass	40,000 - 100,000

[7] Excluding the additional area of building for the secondary pool.

Operational Costs

Introduction

This section identifies the main operational considerations and the implications of selecting the 4, 5, 6 and 8 lane options, with or without a secondary pool.

It reflects the desire to make new 25 m Community Pools as cost effective as possible and able to breakeven in revenue terms. In doing so, it is recognized that historically the vast majority of community swimming pools have required an operational subsidy. In other words, the costs of operating facilities are greater than the income derived. The table on page 19 is a generic illustration of potential income and expenditure differences between the different sized facilities based on an 'optimum' operating model. This has been done to reflect that a modern operating philosophy can result in a break even position. The figures are indicative and not specific to any geographical location or catchment area. The challenge for future operators is to manage facilities as cost-effectively as possible and a number of suggestions are made in this section.

Potential management arrangements

It is assumed that the 25 m Community Pool will be developed by the public sector i.e. Local Authorities possibly in partnership with commercial contractors or charitable trusts.

There are three main routes:

- Direct local authority management
- Partnership with a charitable trust
- Entering into a contract with a commercial operator.

The operational philosophy, the programming, the pricing, staffing levels may vary depending on the chosen operational arrangements. In turn these will influence the levels of income generated and the expenditure incurred and hence the net profit or subsidy. The example budget shown below are based on optimum operating models.

Key factors for a community swimming pool to break-even include:

Commercial management philosophy

Realistic pricing structure

Imaginative, varied and full programme

Dynamic marketing and promotion

Lean staffing structure

Tight controls on expenditure

Evidence suggests that a confluence of these factors can result in nil subsidy or a net surplus.

Pricing, user numbers and staff structure assumptions

Pricing

Summary Prices (net of VAT)	(£)
Casual / Lane swimming Adult	4.50
Casual / Lane swimming Child	2.80
Casual / Lane swimming Concession	2.50
Average Lesson Adult	6.00
Average Lesson Child	5.00
Club Hire	45.00
Seconday School	40.00
Primary School	35.00
Private Hire	50.00
Gala	200.00

Swimming pool programme of use

Throughput / year		6 lane pool	8 lane + secondary pool
Lessons		27,000	33,550
Schools		18,038	28,275
Clubs		12,500	15,000
Private		625	1,000
Casual		94,500	141,600
Gala		1,000	1,500
Spectator		5,000	10,000
	TOTAL	**158,663**	**230,925**

Indicative staffing structure

6 lane pool

Designation	Number	Hours	Salary (£)	Cost (£)	On-costs (£)	Total (£)
General Manager	1	37.5	25,000	25,000	5,000	30,000
Duty Officer	3	112.5	15,000	45,000	9,000	54,000
Swimming Teachers	3	112.5	15,000	45,000	9,000	54,000
Lifeguards	5	225	13,500	67,500	13,500	81,000
Lifeguards (Casual)	2	20	11,500	23,000	4,600	27,600
Maintenance Technician	1	37.5	14,000	14,000	2,800	16,800
Receptionists / Admin	4.5	225	13,000	58,500	11,700	70,200
TOTAL	**20**	**770**	**107,000**	**278,000**	**55,600**	**333,600**

FTE [8] = 20.53 people (based on a 37.5 hours working week)

Note: Cleaning costs in 'sundry expenditure (contracted out)

8 lane + secondary pool

Designation	Number	Hours	Salary (£)	Cost (£)	On-costs (£)	Total (£)
General Manager	1	37.5	27,500	27,500	5,500	33,000
Duty Officer	3	112.5	16,000	48,000	9,600	57,600
Swimming Teachers	3.5	131.25	15,000	52,500	10,500	63,000
Lifeguards	6	225	13,500	81,000	16,200	97,200
Lifeguards (Casual)	5	50	11,500	57,500	11,500	69,000
Maintenance Technician	1.5	56.25	14,000	21,000	4,200	25,200
Receptionists / Admin	6	225	13,000	78,000	15,600	93,600
TOTAL	**26**	**838**	**110,500**	**365,500**	**73,100**	**438,600**

FTE [8] = 22.33 people (based on a 37.5 hours working week)

Note: Cleaning costs in 'sundry expenditure (contracted out)

[8] Full time equivalent.

Indicative 'generic' operating budgets for 4, 5, 6 and 8 lane pools [9]

Order of Cost Summary (net of VAT)	25 m Pool Options (£)[10]					
	4 lane	5 lane	6 lane	6 lane+ secondary pool	8 lane	8 lane+ secondary pool
Income						
Swimming						
Fees and charges for recreational and lane swimming	240,000	265,000	313,425	400,000	355,000	462,560
Learn to swim programmes	100,000	120,000	140,000	160,000	150,000	174,350
Education, club and private hires	30,000	40,000	53,440	65,000	55,000	75,485
Miscellaneous use of the facility	45,000	55,000	65,000	72,500	70,000	75,000
Sub-Total Swimming	**415,000**	**480,000**	**571,865**	**697,500**	**630,000**	**787,395**
Income from sale of items available in the centre: Vending products/ swimming caps / goggles etc.	28,000	30,000	35,699	47,500	43,750	57,731
TOTAL COMBINED INCOME	**443,000**	**510,000**	**607,564**	**745,000**	**673,750**	**845,126**
Estimated Throughput	140,000	150,000	158,663	190,000	175,000	230,925
Average per day (360)	389	417	441	528	486	641
Average per operational hour (16)	24	26	28	33	30	40
Expenditure						
Salaries, National Insurance, Pensions	301,074	316,920	333,600	390,250	350,280	438,600
Sub-Total Staffing Costs	**301,074**	**316,920**	**333,600**	**390,250**	**350,280**	**438,600**
Premises						
Fund for responsive day to day repairs/maintenance [11]	22,720	25,500	28,920	31,700	33,440	42,800
Utilities: gas, electricity and water	53,392	62,475	73,312	82,420	86,944	113,420
Insurance: premises, equipment, personal injury etc	15,000	17,000	19,000	24,000	22,500	25,000
National non-domestic rates payable	40,000	42,500	45,000	57,500	55,000	60,000
Products, consumables and materials	12,500	13,500	14,500	17,000	16,000	18,000
Miscellaneous e.g. licences, electrical testing, etc	6,500	6,500	6,500	9,000	8,000	10,000
Sub-Total Premises	**150,112**	**167,475**	**187,232**	**221,620**	**221,884**	**269,220**
Supplies and Services						
Purchase of stock for sale e.g. vending products, badges	16,800	18,000	21,419	28,500	26,250	34,639
Replacement of non-sale items e.g. Floats etc	5,000	5,500	6,000	7,500	7,000	8,000
Miscellaneous: e.g. Health and Safety consultants etc	5,000	6,000	7,000	10,000	9,000	11,000
Sub Total Supplies and Services	**26,800**	**29,500**	**34,419**	**46,000**	**42,250**	**53,639**
Admin and Marketing						
Marketing, media and communications	7,875	8,978	10,290	14,900	13,475	16,903
Printing, programmes, leaflets etc	5,000	5,500	6,000	8,500	7,500	9,500
Telephones, computers, maintenance and consumables	8,000	8,500	9,000	10,500	10,000	11,500
Collections, direct debit handling fees etc	5,000	5,500	6,000	6,500	6,500	7,000
Sundry items e.g. temp staff cover, customer surveys etc	15,000	17,500	20,000	22,500	22,500	25,000
Sub Total Admin and Marketing	**40,875**	**45,978**	**51,290**	**62,900**	**59,975**	**69,903**
TOTAL OPERATING EXPENDITURE	**518,861**	**559,873**	**606,542**	**720,770**	**674,389**	**831,361**
Summary of Operating Costs						
OPERATING PROFIT / (LOSS)	**(75,861)**	**(49,873)**	**1,022**	**24,230**	**(639)**	**13,765**

9 Based on ground floor gross internal floor areas (GIFA) and excluding lower and upper ground plant areas.

10 It should be noted that there is not always a direct relationship between the size of the pool and the associated income and expenditure. Therefore there are some figures where a pro-rata relationship does not exist.

11 Excluding sinking funds for periodic / cyclic maintenance, debt charges and centralised support costs.

Complementary development

The tables above assume that the Community Pool is a 'standalone' development. Opportunities may exist to link the operation of a new pool to other community leisure facilities (even if the buildings are not physically attached). This will have two main benefits:

- Resources can be shared across sites e.g. staffing can be interchangeable thus reducing costs.
- Linking a pool to other community facilities can create a critical mass which has greater user appeal, particularly where synergy exists such as health suite, dance and healthy living facilities. In these cases, 'membership' packages may be sold with the pool, acting as a catalyst.

Linking swimming pools to other community leisure facilities can reduce costs and create greater user appeal

Maximising financial performance

It is in the operator's interest to maximise usage whilst minimising operating costs. Considerations include:

- Opening hours
- Staffing levels
- Safe bathing loads
- The 'programme of use'.

Programming

The operating philosophy will determine the programme. Most Local Authorities will want to encourage a 'balanced programme' which should include:

- Learn to swim programmes
- Casual recreational swimming
- Fitness (lane) swimming
- Club sessions
- Schools
- Dedicated sessions such as aqua aerobics
- Single sex only
- Parents and toddlers
- Fun sessions.

More specialist activities can also be programmed such as:

- Water polo
- Canoeing
- Octapush
- Sub aqua.

One-off activities such as galas can also be expected together with private hire sessions for parties. The range of activities will depend on policy decisions, operational considerations and local circumstances.

The availability of pool time is a key factor and there may be competing demands. Concurrent use can be made of the pool water area. It is possible to section off two lanes for fitness swimming and have the rest available for casual recreational swimming. Other uses are less compatible and some will require exclusive use (See page 25 for the advantages of a secondary pool).

Every use of the pool is a potential income stream and some activities are likely to be more lucrative than others. Swimming lessons can be a very positive income generator and advantageous from a financial perspective. However, a pool programme that is dominated with lessons may cause limited access to other user groups. A wider pool (e.g. 6 lane) will be beneficial, giving greater flexibility to accommodate concurrent uses.

Levels of secondary income from vending and merchandising will also depend on the programme and associated levels of use.

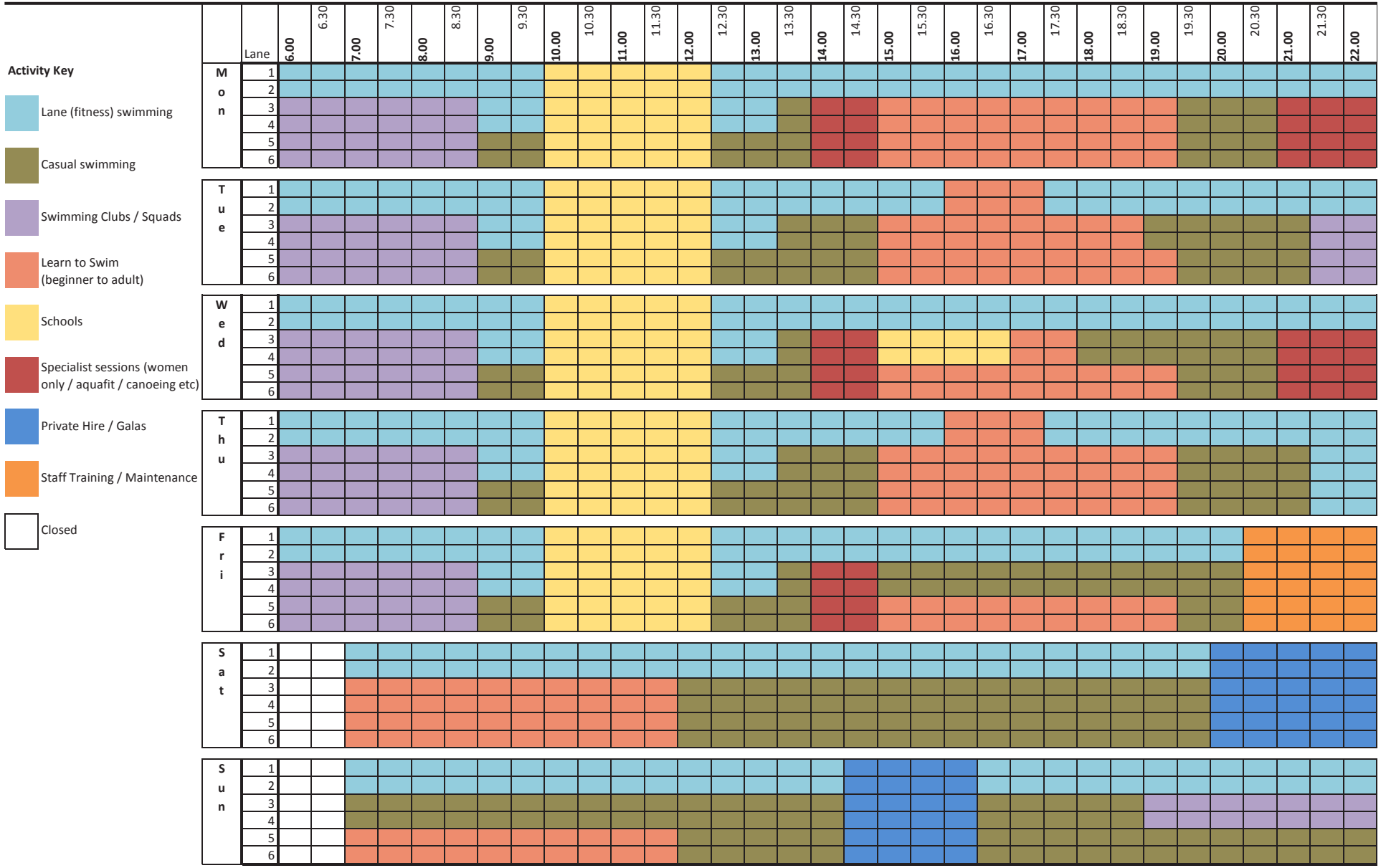
The cost-effectiveness of a community swimming pool is inextricably linked to the programme on offer and how well it is marketed.

A fresh approach to programming swimming pools is advocated, one which includes systematic participation pathways so that swimming becomes a lifestyle and lifelong activity. Partnerships between agencies and organisations should be encouraged and promoted for example by the 'Big Splash' initiative.

An indicative programme of use is illustrated on pages 21 and 22 for the six lane options. Further Indicative programmes of use for the 4, 5, and 8 lane pool options are included in Appendix 7.

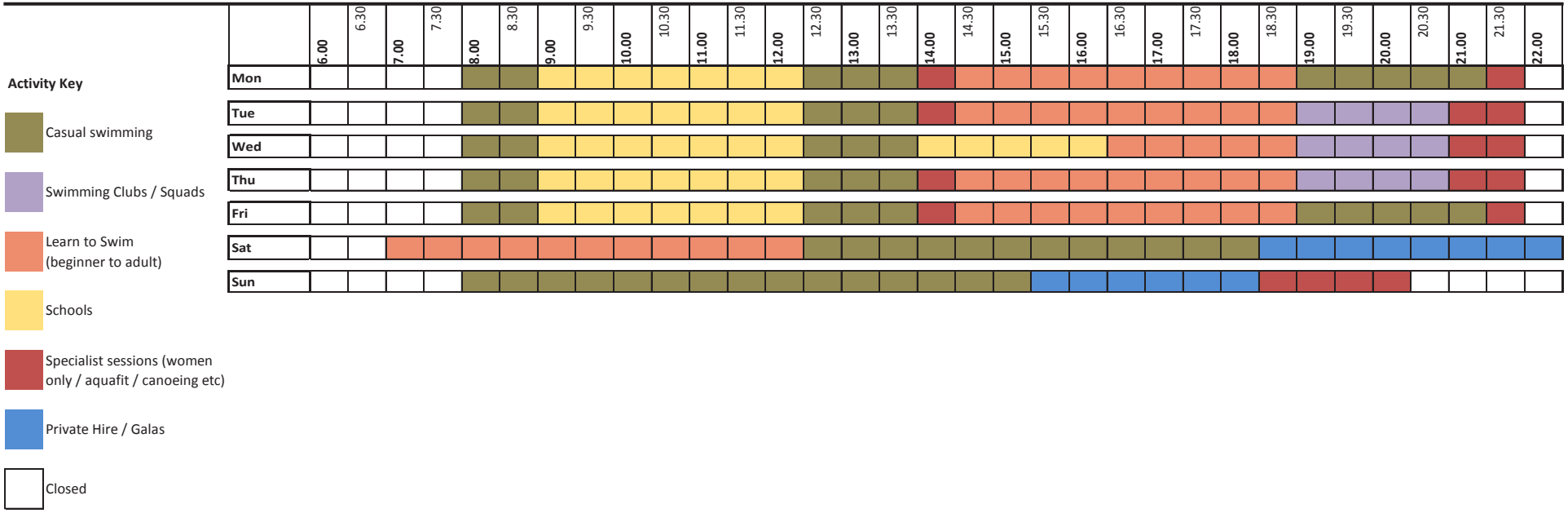
Indicative programme of use (6 lane pool)

Main pool - term time (39 weeks)



Indicative programme of use (secondary pool for 6 lane)

Main pool - term time (39 weeks)



Pricing and Income

Pricing is a variable factor in terms of income generation. Community swimming has traditionally been a subsidised activity where the net cost of providing each opportunity to participate is not fully covered by the fee charged. However, there is a trend away from such blanket subsidies and for a more targeted approach to income. Differential pricing, concessions and various packages such as loyalty schemes may be considered. The level of income is affected by the programme of use and the tariff applied.

Clearly there is a link between the programme and income. A 6 or 8 lane pool provides greater opportunity for a diverse programme and more income than a 4 or 5 lane pool.. For example, structured 'Learn to Swim' programmes that are very lucrative can be accommodated more easily within a bigger pool. The addition of a secondary learner/training pool with a movable floor would give even more potential. See page 25.

Every use of the pool is a potential income stream

Swimming pool expenditure

Operational costs will depend on management arrangements, operational policies, opening hours, programme of use etc. Some of the costs are fixed whilst others are variable.

Staff cost

The biggest operational cost is for staff. In the main these are fixed costs but there will be a variable element such as casual lifeguard cover, linked to variations in the pool programme. A standalone facility will have proportionally higher staff costs than a multi-use site due to the limited ability to share resources.

In typical Local Authority owned facilities, it is not unusual for staffing costs to be equivalent to 50-70% of the income generated. In future this can be reduced by generating higher levels of income and reducing staffing costs. For example, the use of voluntary staff (subject to Health and Safety considerations).

Utilities

The second largest operational cost is utilities. These are mainly fixed because the water and air needs to be treated and heated irrespective of usage levels. However, operational policies will impact on utility costs, for example, by varying bather load, use of showers, backwashing filters etc.

Utilities in the 4 lane pool may be estimated at £50.7 per square metre per annum [12]. These would increase disproportionately in a facility with a bigger pool tank because the increase in the water volume from a 4 lane to a 6 lane pool is 50% whereas the increase in building footprint is only 25%. The water volume is the main draw on utility costs as it impacts on gas, electric and water.

Other premises-related expenditure includes:

- Insurance
- Building cleaning and maintenance
- National Non-Domestic Rates (NNDR can be reduced in certain operational models)
- Refuse collection
- Sewerage charges
- Equipment purchases etc.

Expenditure related to supplies and services will include:

- Pool chemicals
- The purchase of goods for re-sale etc.

These are variable costs and will depend on the volume of use.

Additionally costs will be incurred in the administration and marketing of the community pool. These may include:

- Advertising and promotion (this may be between 1-3% of total income)
- Printing, postage and stationery
- Transport
- Security
- Uniforms
- Licences
- IT, training / consultancy
- Health and safety
- Bank charges etc.

[12] 3rd Quarter 2011

In certain cases it will be necessary to add a 'contribution' to corporate overheads whether these be a Local Authority re-charge for the costs of democracy or a head office re-charge in the case of a commercial contractor. These are non-operational 'below the line' costs and will vary from operator to operator.

Reducing net operating costs

Based on a new more commercial and efficient management philosophy, it is conceivable for a community swimming pool to break even or make a small operational surplus.

Ultimately the financial impact of each facility will be dependent on a combination of the factors raised above. A swimming pool with a lean operation, a packed programme, the ability to minimise taxation costs (NNDR and VAT), higher than average prices will do better financially than a facility that has high staffing levels, high overheads, a restricted programme, subsidised prices etc. That is not to say that the former provides better quality services or contributes more to the community: this depends on the objectives set by the project sponsor and its stakeholder.

The ultimate financial performance of community pools

The main determinants of income and expenditure have been described and clearly the balance between these two factors will result in the 'bottom line'. They will be affected by a number of issues and these need to be considered in detail when preparing a Business Case for a new facility. The location, the competition, the facility mix (size and scope of the pool and complementary facilities), the catchment area demographics, pricing policy, programming etc will all impact on income. It is harder to predict with any certainty future income levels but much easier to forecast expenditure due to many of the costs being largely fixed. Staffing levels and remuneration should be considered carefully and kept to a minimum subject to having the requisite levels to maintain a safe and user-friendly experience. The design of the pool and the efficiency of the plant can also impact on running costs e.g. the use of CHP units. NNDR costs can be reduced by up to 85% depending on the status of the operator. Similarly further savings in VAT can be generated subject to the operating model.

Due consideration of the factors referred to above can make the difference between operating at a cost or a surplus.

Key factors to consider in the business plan include:

- ***Location***
- ***Competition from other facilities***
- ***Size and scope***
- ***Complementary facilities***
- ***Catchment area demographics***
- ***Programme***
- ***Pricing***

Lifecycle maintenance costs

These are crucial to the on-going operational effectiveness of a community pool. Sufficient money must be put aside to ensure the regular redecoration and refurbishment of the building fabric and finishes and the replacement of plant and equipment. The appearance, ambience and environmental comfort of a facility are all critical in ensuring repeat business over a sustained period of time.

Occupancy and maintenance costs

Annual maintenance and occupancy costs for a particular building design will be affected by a variety of factors, which should be taken into account when using this estimate.

- Size, shape and layout
- Design and specification (sustainable technologies included)
- Intensity of use
- Location.

Approximate estimates for the average annual cost of maintaining and occupying the building are used in the indicative budgets on page 19.

Secondary pool and movable floors

The introduction of a 'secondary' supporting pool can significantly enhance the flexibility and cost-effectiveness of a community pool. It can provide greater programming options leading to higher user numbers and therefore more income. The addition of a variable depth movable floor in either the main or secondary pool pool can improve the operational performance still further.

A secondary pool tank would traditionally have been referred to as a 'teaching' or 'learner' pool and often added to 6 lane (or larger) community pools where there has been sufficient demand within the catchment area for the additional volume of water. Although mainly rectangular, in some cases these have been 'freeform' pools with 'beach' areas or steps and intended to introduce young children to water activities and develop confidence. However, this type of configuration has the disadvantage of disproportionately increasing running (and capital) costs due to the increased water area without making a meaningful contribution to income streams.

It is suggested that secondary pools should be designed for flexibility in operation and be programmed to be 'complementary' to the main pool tank. It should be actively programmed throughout the opening hours in the same way as the main pool.

Whilst learn to swim courses are likely to remain a mainstay of the programme and income, the secondary pool should be far more than a 'teaching' pool. Sometimes it can provide a direct supporting role such as a warm-up / warm down facility for competition and in some cases it will have an independent purpose such as for swimming lessons whilst training or casual swimming is taking place in the main pool. The variable depth moving floor can accommodate a wide range of aquatic activities including rehabilitation, aqua-natal classes, 'aqua-aerobics', lifesaving, sub-aqua, canoeing etc. The variety of programming options is limited only by the imagination of the operator.

Through careful design, physical separation of the secondary pools can give privacy of some user groups, whilst at other times the two pools can be readily accessed. During general casual swimming sessions it is often more appealing to family groups with more competent members of the family using the main tank with other members using the smaller shallower secondary pool.

Increasing a six lane pool to an eight lane pool involves an increase in water of circa 105 m^2. A secondary 'supporting' pool could be provided with a similar or smaller m^2 of water space. The two pool model would be much more flexible, would generate more throughput and would be more cost-effective than the single pool model. This does of course depend on the ability of the operator to maximize the potential benefits and assumes that a wide range of aquatic activities is a higher priority than competition swimming.

Other pool profiles

There are also a number of different permutations for including movable floors within the main tank that give additional flexibility and cost-effectiveness for a community pool.

It would be possible to have a movable floor across the entire length of the pool but it is more likely that it would be limited to a portion of the pool length. See typical pool profile options in Appendix 1. The decision about whether to have a double shallow ended pool, a single depth or a graduated depth pool with or without a movable floor depends on the range of activities envisaged within the pool. This usually involves some compromises. For example a pool ideal for teaching is not ideal for water polo or competitive swimming. Movable floors can be used to increase flexibility but there is still a need to define the objectives of the facility before embarking on the specification and design.

Summary

A larger pool has the potential to operate more cost-effectively than a smaller pool because it can generate additional income which is disproportionate to the additional running costs incurred. This financial improvement could be used to off-set the higher capital costs.

The improvement in financial performance of the 6 lane pool is such that the difference in capital costs between the 6 lane pool and 4 lane pool could be covered within 5 years. In addition, a 6 lane pool will provide more aquatic activities to more people thus having a greater positive impact on the community. More striking is the even better financial performance that is achieved with the inclusion of a secondary pool that can be programmed to complement the activities within the 6 lane main pool.

It will be apparent however that thess findings are heavily qualified because there are so many variables.

Procurement and Delivery

Consultant team appointment

Sport England encourages public sector clients to use the Government Procurement Service 'Project Management and Full Design Team Services Framework'. These provide a comprehensive 'one-stop-shop' solution for a wide range of services and specifically for Project Management and Design Team services. Such frameworks are suitable for all procurement routes and have been tendered through the OJEU process, thereby significantly reducing the time taken to select and appoint the consultant team. Further details can be found at:

www.buyingsolutions.gov.uk.

Some Local Authorities may have their own consultant frameworks in place. However, it is important that the consultants on these frameworks have specific swimming pool experience.

Procurement route

The choice of procurement route is critical to the success of any construction project. Every project has unique requirements and therefore all viable procurement options need to be appraised at the beginning of the project.

This document illustrates a 'Single Stage Design and Build' procurement route, where the design is developed to RIBA Stage E (final proposals) at which point the works are tendered. This procurement route is sometimes referred to as a 'Develop and Construct' procurement route due to the more advanced stage of the design prior to tendering. This procurement route has been chosen for the following reasons:

- A fixed price is obtained for the construction contract following tender which will allow earlier confirmation of costs than some other procurement routes.
- Due to the fixed price construction contract, greater cost certainty is obtained when compared to other procurement routes. The contractor takes the risk on many factors, which could otherwise lead to increased costs such as design development, compliance with statutory requirements and management of sub-contractors.
- The contractor will provide a single point of responsibility for design, progress and construction.
- Build quality can be ensured due to the more detailed pre-tender stage design.
- An element of competition is introduced into the final design as well as in the construction, therefore obtaining the best price for a known product.
- Construction can commence before all of the design work has been completed. This reduces the overall development timescales and provides the completed facility at an earlier date than some other procurement routes.
- Experienced contractors can be used to refine the construction details, structural engineering and building services to improve buildability.
- The designer's fees for the production design work are deferred until the contractor is appointed and the fees are included within the building contract.
- Potential saving in consultants fees.

Planning and Building Control

Planning and Building Control applications will be made following completion of RIBA design stages D and E respectively.

Building Regulations approval could be achieved through the local authority's Building Control department, or through an Approved Inspector. The decision on which route to use will be depend on individual project circumstances.

The programme assumes a conditional approval will be received on the Building Regulation's application during the tender period. The risk associated with obtaining Building Regulations approval can then be transferred to the Contractor prior to entering into contract.

Contractor appointment

There are a number of Contractor Framework Contracts available to public sector clients that should be considered in a procurement evaluation process. For example:

- Improvement and Efficiency South East (IESE) Framework
- YORbuild Framework
- Construction Framework South West.
- Scape Sytem Build Ltd.

These frameworks have been tendered through the Official Journal for the European Union (OJEU) and this substantially reduces the timescales and resource required to select the tendering contractors. The contractors are also measured against Key Performance Indicators (KPIs) which encourage them to do a good job and treat the contract as repeat business. Local Authorities may have their own contractor frameworks in place. It is important however that the contractors on a framework have suitable swimming pool experience and where this is not available, then an alternative framework or the OJEU process should be used.

Some contract frameworks provide an opportunity to involve a contractor earlier in the design process and this should also be considered during the procurement review process.

Construction programme

An outline indicative programme has been prepared to demonstrate the likely timescales for delivery of the 6 lane pool project contained in this document. This shows that the project could be completed within 24 months [13] of the decision to progress the scheme using a 'Single Stage Design & Build' procurement route.

If the 8 lane options are to be developed, or if there are significant amendments to the smaller designs, then it is likely that the overall programme will take longer. The method of procurement will also have an impact on the overall programme and the two will need to be carefully balanced.

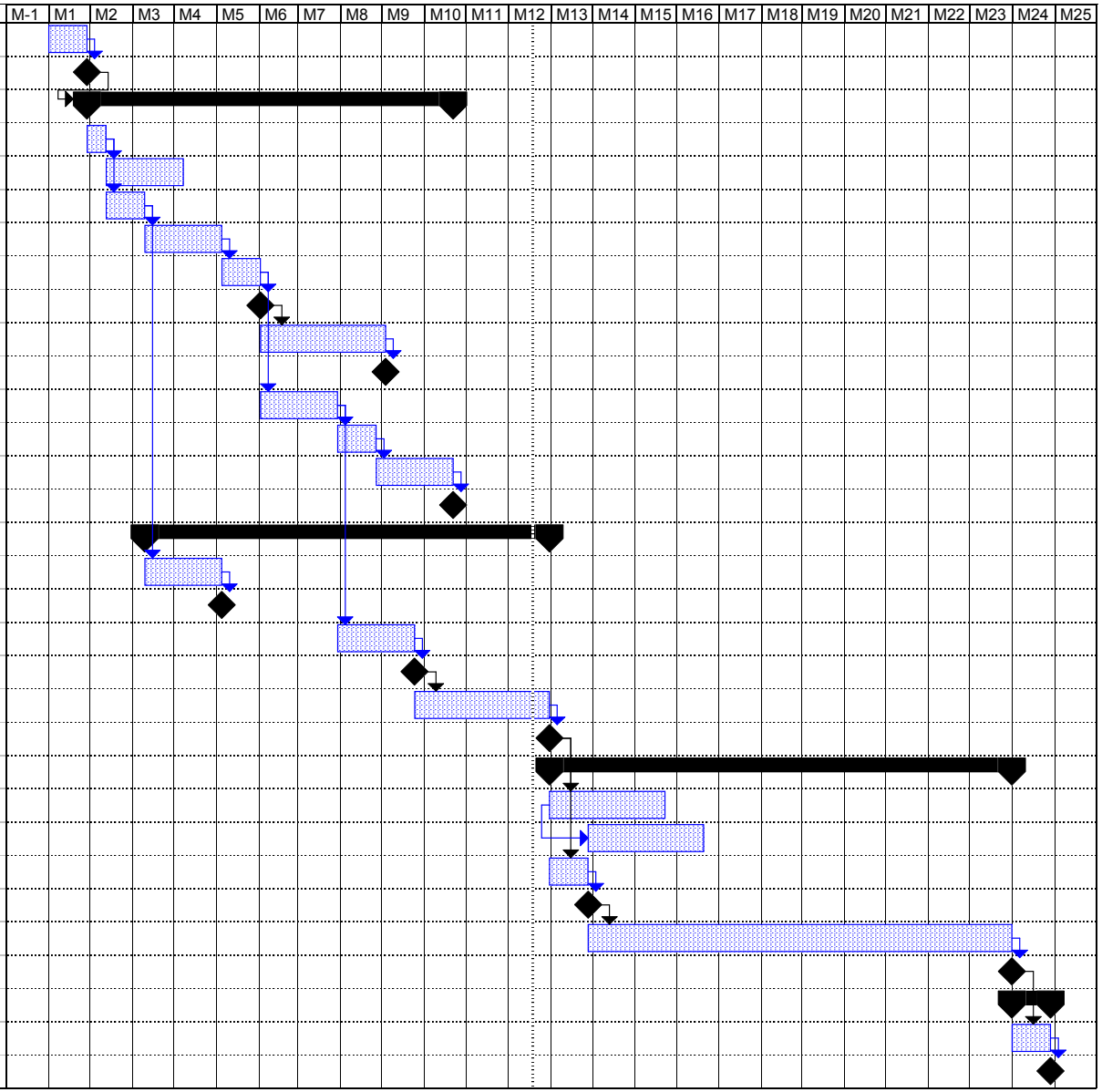
As this is an outline indicative programme, it will need to be developed by the appointed Project Manager to further breakdown each stage of the project and to provide a more detailed analysis of the design development, approvals, planning and consultation strategy. The involvement of a contractor at an early stage through a contractor framework will also enable input on the programme for the construction phase.

A new 6 lane swimming pool can be opened within 24 months (potentially saving 2 – 3 years on the average programme).

[13] The programme assumes a construction period of 11 months for the 6 lane swimming pool building (and for the 5 lane option). 10 and 12 months construction period are assumed for the 4 and 8 lane options respectively, but with the overall programme period remaining at 24 months.

Programme

ID	Task Name	Duration
1	Consultant Team Appointment	4 wks
2	Appoint Consultant Team	0 days
3	**Design and Approvals**	**190 days**
4	Develop Client's Strategic Brief - Stage A/B	2 wks
5	Carry out Ground Investigation and Other Surveys	8 wks
6	Develop Sport England Outline Proposals - Stage C	4 wks
7	Prepare Detailed Proposals - Stage D	8 wks
8	Prepare and Submit Detailed Planning Application	4 wks
9	Submit Detailed Planning Application	0 days
10	Planning Period	13 wks
11	Planning Approval	0 days
12	Prepare Final Proposals - Stage E	8 wks
13	Prepare and Submit Initial Building Control Submission	4 wks
14	Building Control Review Period	8 wks
15	Conditional Building Control Approval	0 days
16	**Contractor Selection and Appointment**	**210 days**
17	Contractor Selection	8 wks
18	Confirm Contractor Tender List	0 days
19	Prepare Tender Documentation - Stage G	8 wks
20	Issue Invitation to Tender (ITT)	0 days
21	Tender Period and Evaluation - Stage H	14 wks
22	Appoint Main Contractor	0 days
23	**Construction**	**240 days**
24	Production Information for Construction - Stage F	12 wks
25	Submission of Further Information to Building Control	12 wks
26	Mobilisation - Stage J	4 wks
27	Start On Site	0 days
28	Construction Period - Stage K	11 mons
29	Hand Over to Client - Practical Completion	0 days
30	**Use**	**20 days**
31	Client's Fit-Out and Training	4 wks
32	Facility Open	0 wks



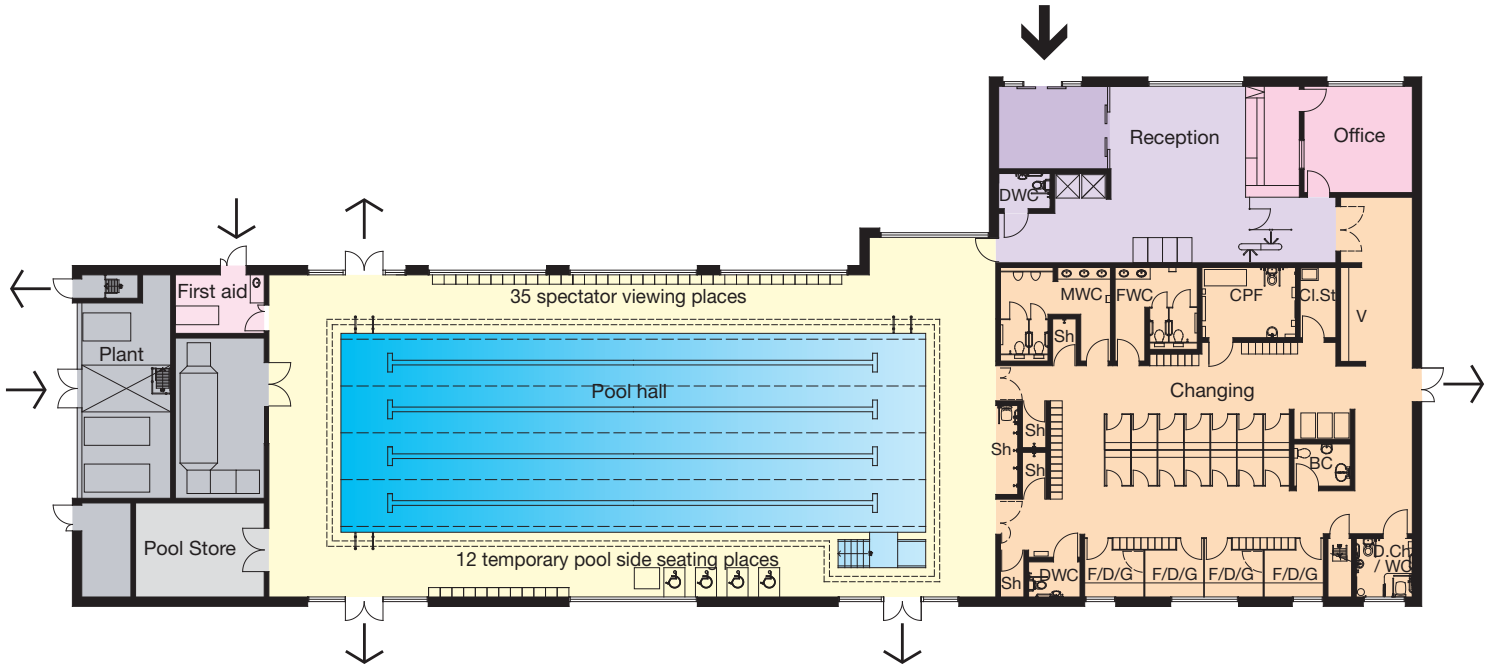
Appendix 1
Indicative Designs for 4, 5 and 8 Lane Pools

The indicative designs for the 6 lane 25 m pool illustrated on pages 9-13 have the flexibility to be applicable to many locations with widespread benefits. Alternative designs are illustrated below for 4, 5 and 8 lane swimming pools with appropriate variations in changing and support accommodation.

It should be noted however, that the alternative plan options are based on a fixed floor profile and the adoption of moving floor technology in the main or support pool will have an influence on the user capacity and changing accommodation. Similarly, variations in seating numbers and the energy targets that are set for the building will have an impact on the overall area of the building.

In these respects, the plans should be considered to be more indicative and requiring more detailed considerations in the context of the particular project being considered.

The plans are 'indicative' and will require detailed considerations in the context of the particular project.



Key

- Staff area
- Reception / circulation
- First aid
- Main entrance
- Plant
- Pool store
- Pool hall
- Pool Tank
- Changing

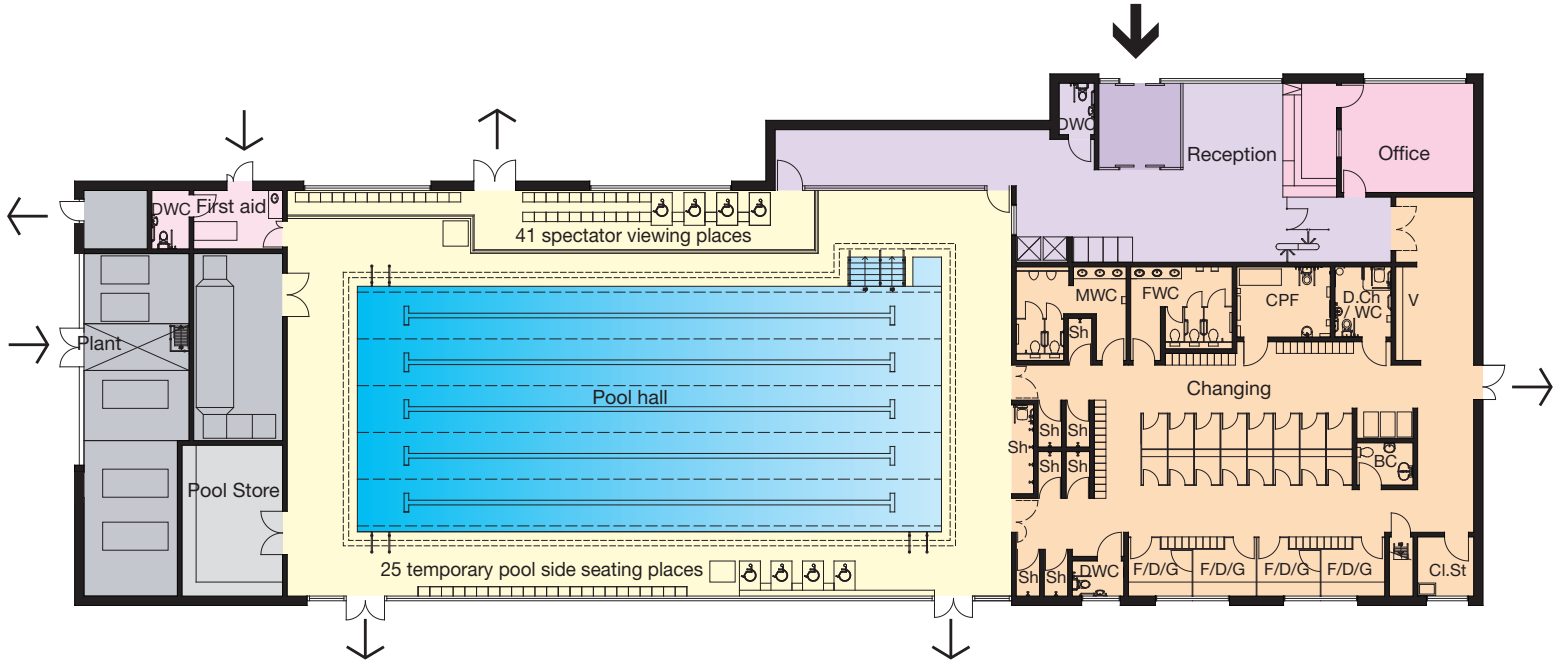
BC	Baby change
Cl. St	Cleaners store
CPF	Changing Places Facility
D.Ch/WC	Unisex accessible changing room with WC
D.Sh	Unisex accessible shower cubicle
DWC	Unisex accessible WC
F/D/G	Family / disabled accessible changing / group cubicle
Sh	Shower
V	Vanity area

North

0 5 10m

Ground floor plan

5 lane pool



Ground floor plan

Key

- Staff area
- Reception / circulation
- First aid
- Main entrance
- Plant
- Pool store
- Pool hall
- Pool Tank
- Changing

BC	Baby change
Cl. St	Cleaners store
CPF	Changing Places Facility
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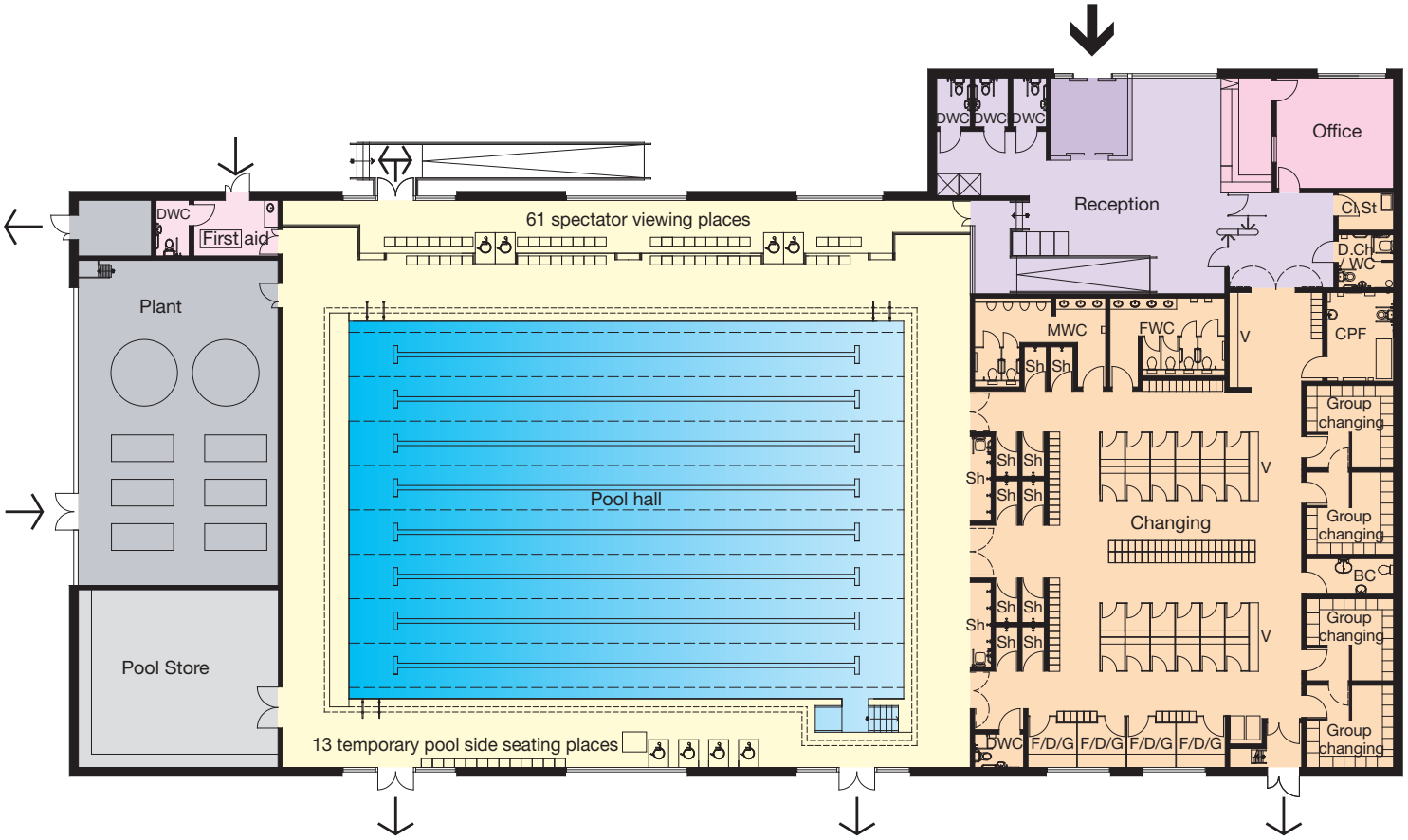
DWC	Unisex accessible WC
F/D/G	Family / disabled accessible changing / group cubicle
Sh	Shower
V	Vanity area

North

0 5 10m



Ground floor plan

Key

- Staff area
- Reception / circulation
- First aid
- Main entrance
- Plant
- Pool store
- Pool hall
- Pool Tank
- Changing

BC	Baby change
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CPF	Changing Places Facility
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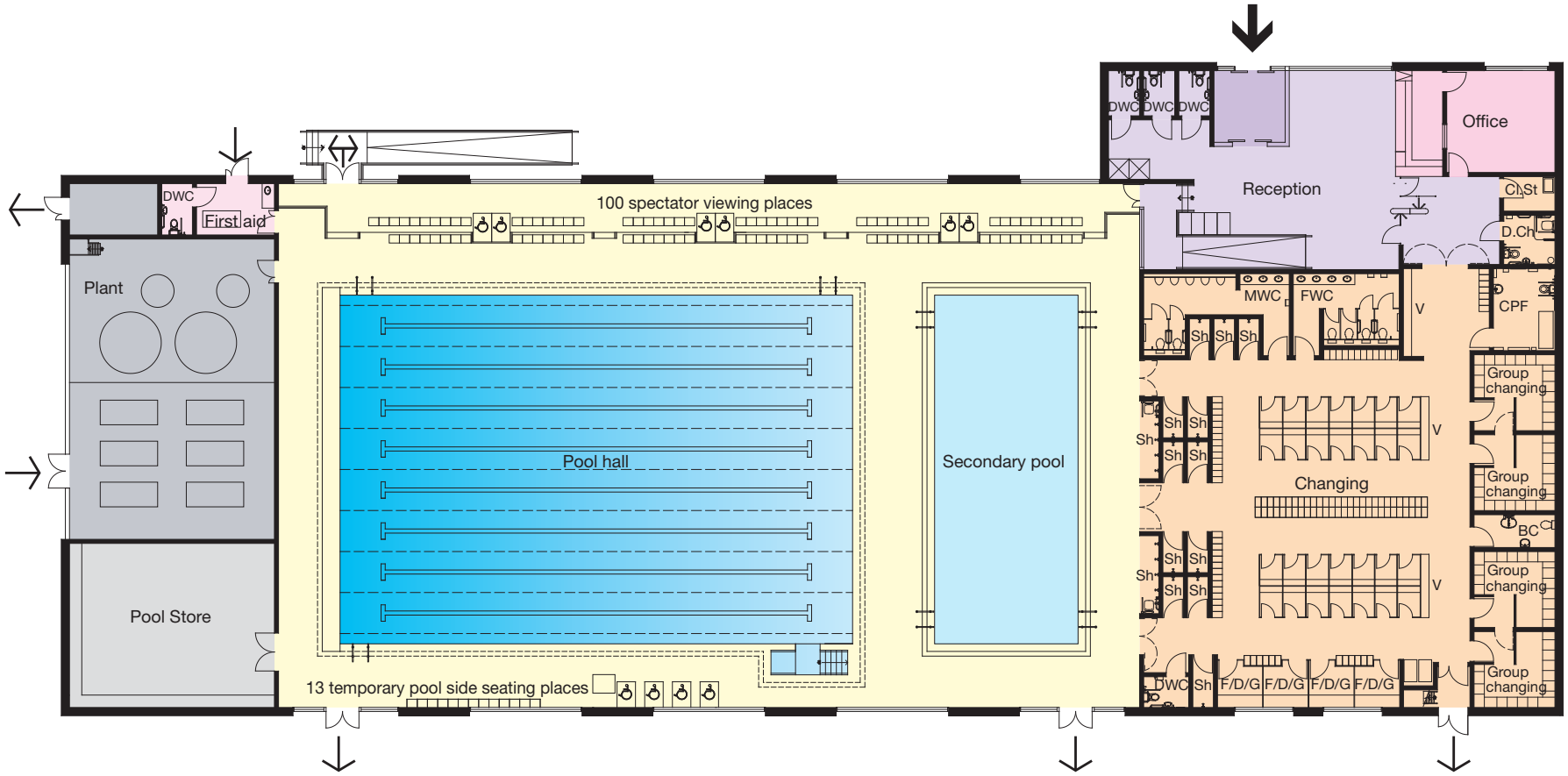
DWC	Unisex accessible WC
F/D/G	Family / disabled accessible changing / group cubicle
Sh	Shower
V	Vanity area

North

0 5 10m

8 lane pool with secondary pool



Ground floor plan

Key

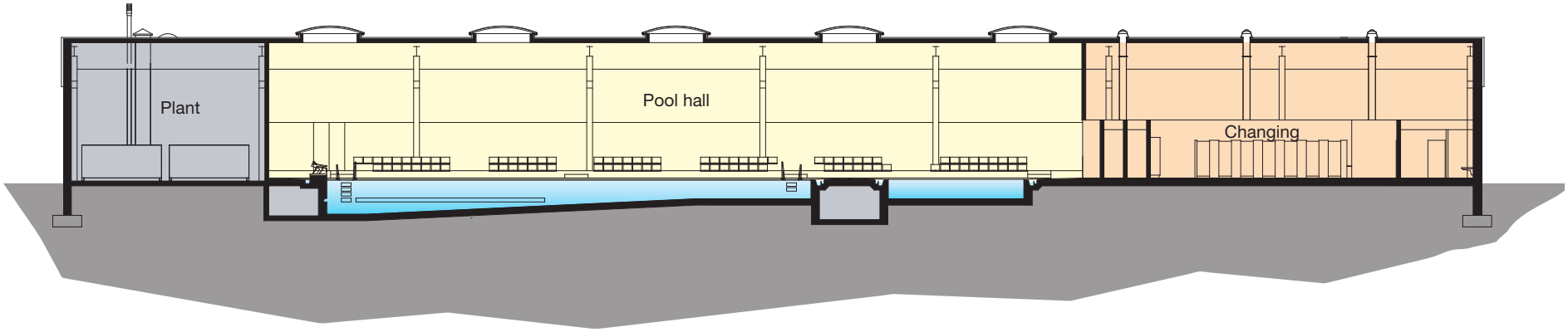
- Staff area
- Reception / circulation
- First aid
- Main entrance
- Plant
- Pool store
- Pool hall
- Pool Tank

	Changing
BC	Baby change
Cl. St	Cleaners store
CPF	Changing Places Facility
D.Ch/WC	Unisex accessible changing room with WC
D.Sh	Unisex accessible shower cubicle
DWC	Unisex accessible WC
F/D/G	Family / disabled accessible changing / group cubicle
Sh	Shower
V	Vanity area

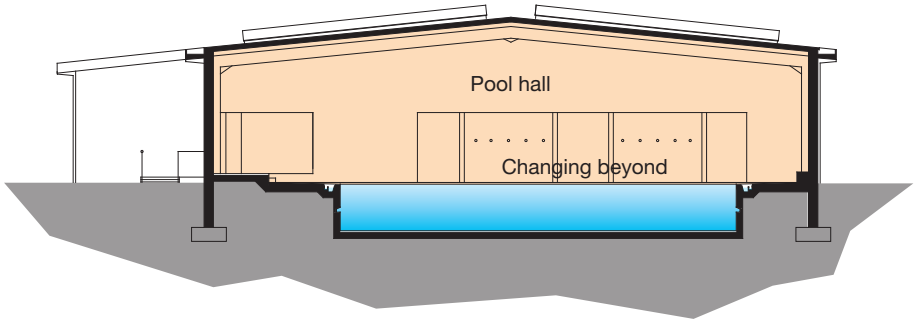
North

0 5 10m

8 lane pool with secondary pool



Long section



Cross section

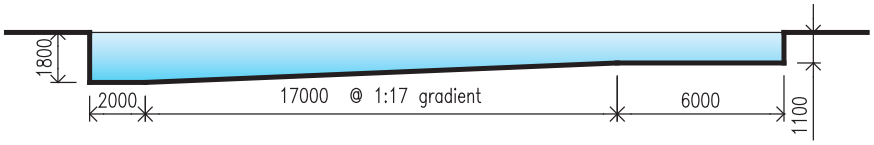
Key

- Reception / circulation
- First aid
- Plant
- Pool store
- Pool hall
- Pool Tank
- Soffit / applied ceiling
- Changing

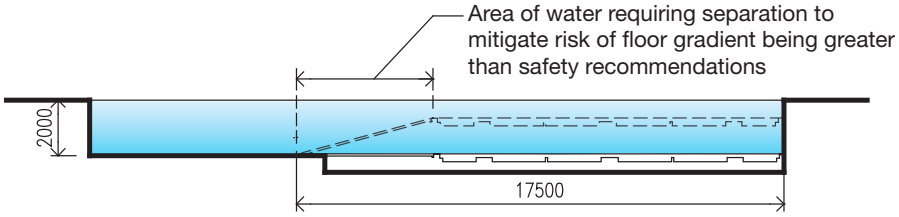
0 5 10m

8 lane pool tank options

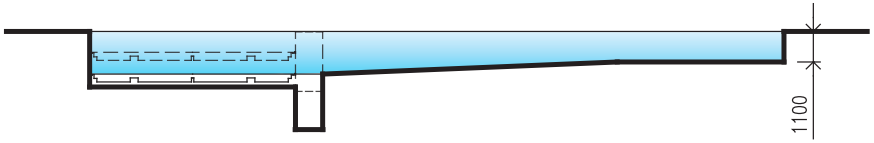
The diagrams below illustrate different pool tank profiles which are possible within the range of designs, subject to adjustments of the pool hall and wet change configuration. See *'Movable floors and bulkheads'* section of Sport England's *'Swimming Pools'* design guidance note for further information.



Fixed profiled pool floor



Moving profiled pool floor with flap



Moving profiled pool floor with rising boom

Changing room access side generally

Alternative location for secondary pool with moving floor to avoid the safety issue of deep water adjacent to the changing room access.
NB: this also increases the building footprint

Fixed profiled pool floor

Fixed pool floor

Appendix 2
Building Fabric [14]

The following has been assumed for the indicative designs and cost estimates:

Design life

The main building structure to be specified to acheive a 50 year design life and the building envelope, the key internal features, furniture and finishes to be formed with materials with a long live expectancy (minimum of 25 years). All elements of the building that require cyclical maintenance and /or replacement to be selected with life cycle costing in mind.

Workmanship and materials generally

The works to be designed, and to be constructed to comply with all statutory and national standards and all the relevant British or European Standards. Full account to be taken of relevant Sport England Design Guidance Notes.

Structure

The design to take the buildings functional requirements fully into account. The structural grid to be chosen to achieve the most efficiency in terms of use and cost.

External masonry walls and cladding

The Building is designed to allow alternative materials to be used as the outer leaf of the external cavity wall, providing flexibility for individual site locations. Influences on the choice of materials to include:

- Location and site specific requirements
- Topography
- Planning requirements
- Sustainability.

The construction to comprise:

- An inner leaf of 140 mm thick concrete blockwork with mineral wool insulation, vapour barrier / breather membrane, suitable for use with outer leafs of facing brick or rendered blockwork or stone.
- Alternatively, a rain screen system with polyester powder coat finish fixed to a proprietary carrier system complete with breather membrane, thermal insulation and vapour barrier over an inner leaf of 140 mm blockwork with secondary steel framing.

[14] Produced for the 6 lane option. Variations may be required for other options.

The building fabric to be designed for long life expectancy and low annual maintenance costs

All external masonry walls to meet the 'U' values noted in the Energy and Sustainability section of this document.

Masonry facades to be constructed in accordance with BS 5628 Code of Practice for Use of Masonry and BS 8000: Pt 3 Code of Practice for Masonry Workmanship on Site.

All external walls to be designed to comply with BS 6399: Pt 2 Code of Practice for Wind Loading.

External louvres

External louvres to be fully demountable with pass doors of proprietary manufacture. The free air area to suit the Mechanical Services Engineers requirements.

Curtain walling and windows

Curtain walling generally:

- To be proprietary powder coated aluminium; thermally broken, pressure equalised, drained and ventilated curtain-walling system. Section sizes to suit individual spans including any necessary additional mild steel framing.

- Glass to be double-glazed sealed units, with toughened outer pane and toughened laminated glass inner pane.
- Doors not included as entrance doors or associated with curtain walling, glazed screens or louvres to be aluminium door sets with insulated infill panels.

Windows generally:

- Proprietary powder coated aluminium thermally improved window system to BS6375: Part 2. Glass to be double-glazed sealed units.
- All fenestration to meet the 'U' values noted in the Energy and Sustainability section of this document.
- Glazing including thermal separation of framework to be in accordance with DIN 4108 or equivalent national standard.
- Manifestation strips to be incorporated on glazing, where required, to comply with statutory legislation. Such strips to be incorporated at dual height to suit eye heights of both ambulant and wheelchair bound users.
- Subject to the building's orientation and external landscaping and natural shading, automatic light sensor activated roller blinds just above top transoms to allow specular reflection / glare to be controlled and lighting levels to be maintained in overcast conditions when retracted.
- All glass to comply with BS 6206 minimum Class A to dry areas and Class C to wet areas, where required by The Building Regulations. Thermal glazing to be the subject of a thermal shading check and where necessary, the outer skin to be toughened. All glass to poolside to be laminated to BS6206.

Automatic entrance doors

Electro-mechanical Bi-Parting sliding fully glazed aluminium framed doors with microprocessor control and silent brushless D.C. motor. Doors to be linked to fire alarm for emergency egress.

Doors not included as entrance doors or associated with curtain walling, glazed screens or louvres to be aluminium door sets with insulated infill panels.

Roof

The roof to be designed as a single mono-pitch or dual pitch comprising of:

- Standing seam aluminium roof system on mineral fibre insulation (thickness as required to give required U-value noted in the Energy and Sustainability section of this document) on vapour barrier on acoustic membrane on acoustic insulation batt adhered to perforated aluminium structural deck. The roof to allow for a Reverberation Time (RT) of 2.0 seconds across a range of frequencies in the pool hall.
- Roof drainage to incorporate aluminium eaves gutters, insulated where necessary, and aluminium rainwater pipes externally.
- The roof to include integrated fall arrest system to comply with current legislation with supplementary hard-point locations to provide protection to verges.
- Proprietary low-rise barrel rooflights 3.0 x 10.0 m to pool hall with double skin polycarbonate glazing cassettes and integral drainage channels on thermally broken insulated builders work kerbs.
- Sun pipes to changing rooms.

Possible variations on the roof design

Timber laminated (Glulam) may be used as an alternative primary structure for the pool hall roof that would have reduced maintenance requirements. This option would give an alternative internal appearance with deeper sections and it would also allow some of the structural columns to be external and an alternative external appearance.

A single ply membrane may be considered where the building is not overlooked and the appearance in not critical. A sedum roof may be appropriate in

environmentally sensitive areas where green area issues are paramount. The roof structure would need to be reviewed to pursue this option.

It is envisaged the aluminium profile structural deck to the pool hall is retained in any roof construction option in order to provide a durable low maintenance finish and facilitate the necessary acoustic absorption.

Internal partitions

Generally, blockwork is to be finished with a sand cement render and wall tiling. Blockwork built up from floors, where designated as “wet”, to have a dpc linked with the over-slab dpm.

Blockwork panels to be sized, restrained and detailed in conjunction with the Structural Engineers.

The building to be considered as one compartment for the purposes of the Building Regulations – Approved Document Part B. Boilers are to be separated from the public areas and other plant areas within the building by fire resisting construction.

Sanitary ware

Each sanitary assembly to consist of functionally compatible components obtained from a single manufacturer and installed in accordance with the

manufacturer’s instructions. Appliances to be securely fixed to structure. Jointing and bedding to be as manufacturer’s recommendations.

All accessible aids to toilets and changing areas (e.g. doc M packs) to be in accordance with BS8300 and the Building Regulations Approved Document Part M and fixed as per the manufacturer’s instructions.

Pool tank

The core design to allow for the swimming pool tank to be constructed in reinforced concrete to a ‘water retaining’ standard in line with the majority of public swimming pools in the UK. The tank would be ground bearing with ‘rationlised’ pool services buried beneath the pool surround and linking back to the lower level plant room. However, a range of alternative pool tank construction options could also be included such as:

- Prefabricated stainless steel wall panels and pvc floor lining
- Alternative methods of concrete and masonry construction.

The selection of the most suitable system for an individual site location to depend on a range of factors that include:

- Capital cost
- Maintenance and periodic replacement costs
- Construction programme
- A range of technical issues.

Outline of internal materials

Area	Specification
Entrance Lobby	
Floor	Ceramic tile. Slip resistance R9 with +40 pendulum in the dry. To comply with BS 5385 and polypropylene / aluminium entrance matting in a recessed matwell.
Skirting	Hardwood / painted MDF for plastered wall only
Walls	Painted plaster, aluminium internal and external glazed screen.
Ceiling	Suspended / solid plasterboard.
Doors	Aluminium glazed electro – mechanical automatic entrance doors.
Fittings	-
Reception	
Floor	Ceramic tile. Slip resistance R9 with +40 pendulum in the dry. To comply with BS 5385.
Skirting	Hardwood / painted MDF.
Walls	Painted plaster / aluminium glazed screens.
Ceiling	Suspended / solid plasterboard.
Doors	-
Fittings	Solid grade laminate reception desk with dropped accessible sections for wheelchair use from both sides of the desk.
	Desk to incorporate suitable task lighting.
	Automatic turnstiles with card swipe access control.
	Disabled persons access gate.
	Buggy park rail and locks.
	Services for vending machines to client supply.
	Induction loop.
	Viewing panel from office with one-way glass.
Office	
Floor	Carpet tiles.
Skirting	Hardwood / painted MDF.
Walls	Painted plaster.
Ceiling	600 x 600mm mineral fibre ceiling tiles in semi-concealed grid.
Doors	Solid core, veneered with stainless steel ironmongery.
Fittings	Dado trunking wired for power, data and communications.
	Furniture (client supply).
	Provision for assistance dogs resting / tethering point.

Swimming pool environment

All areas such as toilets / changing and circulation areas that are subject to the swimming pool environment to be designed to the same standard as the pool hall in order to resist the associated high humidity and temperature. Special attention to be given to the risk of interstitial condensation and corrosion. All exposed metal elements to be treated with a corrosion resistant paint finish.

Changing Rooms

General Area	
Generally	Space standards for changing areas, cubicles, benching, circulation etc is to be strictly in line with Sport England Design Guidance Notes. All changing areas and toilets shall have contrasting colours to cubicle doors, seats, grab rails and signage / wrist bands etc. to assist users with a visual impairment.
Floor	Designated wet floor with ceramic tile grade C slip resistant, (+40 pendulum in wet). Laid to max fall 1/40 to floor drainage channels on fine concrete screed, min thickness 75 mm on continuous dpm on structural slab.
Skirting	Coved ceramic tile.
Walls	Ceramic tile to 2.3 m above floor level. Painted render above.
Ceiling	Generally: Perforated aluminium liner sheet with acoustic quilt over as part of roof construction. Painted structural steelwork. Sun pipes as located on drawings. Vanity area: 1200 x 600 mm moisture resistant mineral fibre ceiling tiles in semi-concealed grid. Ceiling support system to be galvanised / polyester powder coated.
Doors	Solid GRP door sets, warranted for use in wet areas with factory fitted ironmongery.
Fittings	Cubicles – solid grade laminate cubicles fully framed with anodised aluminium framing. With cantilevered solid grade laminate benching. Lockers (on a coved tiled concrete plinth) – mixed single, double and treble split height lockers with aluminium bodies and solid grade laminate doors with coin return key operated locks. Component design to be in full compliance with Sport England Guidance. Vanity top to accommodate hair dryers. Wall mounted safety mirrors to BS6206 Class A.
Male and Female Toilets	
Floor	Designated wet floor with ceramic tile grade C slip resistant, (+40 pendulum in wet). Laid to falls to floor gullies on fine concrete screed, min thickness 75 mm on continuous dpm on structural slab.
Skirting	Coved ceramic tile.
Walls	Ceramic tile to 2.3 m above floor level. Painted render above.
Ceiling	600 x 600 mm moisture resistant mineral fibre ceiling tiles in semi-concealed grid. Ceiling support system to be galvanised / polyester powder coated.
Doors	Solid GRP door sets, warranted for use in wet areas with factory fitted ironmongery.
Fittings	Cubicles – solid grade laminate cubicles fully framed with anodised aluminium framing. Sanitary ware. Vanity top to accommodate inset wash hand basins (WHB) with premixed water supplied by percussion taps with wall mounted safety mirrors to BS6206 Class A. Doc M packs for ambulant access to one wc and urinal.

Unisex Changing Places Facility and Unisex Accessible Changing Room	
Floor	Designated wet floor with ceramic tile grade C slip resistant, (+40 pendulum in wet). Laid to falls to floor drainage gully on fine concrete screed, min thickness 75 mm, on continuous dpm on structural slab.
Skirting	Coved ceramic tile.
Walls	Ceramic tile to 2.3 m above floor level. Painted render above.
Ceiling	600x600 moisture resistant mineral fibre ceiling tiles in semi-concealed grid. Ceiling support system to be galvanised / polyester powder coated.
Doors	Solid GRP door sets, warranted for use in wet areas with factory fitted ironmongery.
Fittings	Hoist for peninsular rooms fixed to structure over.
	Sanitary ware.
	Doc M shower pack.
	Doc M toilet pack.
	Warm air hand dryer.
	Safety mirrors, one full height.
	Changing Places Facility and accessible changing rooms are to be fully compliant with Sport England Guidance, BS 8300 and Approved Document Part M of the Building Regulations.
Cleaner's Store	
Floor	Designated wet floor with ceramic tile grade C slip resistant, (+40 pendulum in wet). Laid to falls to floor drainage gully on fine concrete screed, min thickness 75 mm, on continuous dpm on structural slab.
Skirting	Coved ceramic tile.
Ceiling	600 x 600 mm moisture resistant mineral fibre ceiling tiles in semi-concealed grid. Ceiling support system to be galvanised / polyester powder coated.
Walls	Painted blockwork.
Doors	Solid core, veneered with stainless steel ironmongery.
Fittings	Cleaners sink.
	Shelves.
Baby Changing	
Floor	Designated wet floor with ceramic tile grade C slip resistant, (+40 pendulum in wet). Laid to falls to floor drainage gully on fine concrete screed, min thickness 75 mm, on continuous dpm on structural slab.
Skirting	Coved ceramic tile.
Ceiling	600 x 600 mm moisture resistant mineral fibre ceiling tiles in semi-concealed grid. Ceiling support system to be galvanised / polyester powder coated.
Walls	Ceramic tile to 2.3 m above floor level. Painted render above.
Doors	Solid GRP door sets, warranted for use in wet areas with factory fitted ironmongery.
Fittings	Sanitary ware.
	Fold down baby change table.
	Mirror.
	Sanitary ware – WC WHB.

Unisex Accessible WC	
Floor	Designated wet floor with ceramic tile grade C slip resistant, (+40 pendulum in wet). Laid to falls to floor drainage gully on fine concrete screed, min thickness 75 mm, on continuous dpm on structural slab.
Skirting	Coved ceramic tile.
Ceiling	600 x 600 mm moisture resistant mineral fibre ceiling tiles in semi-concealed grid. Ceiling support system to be galvanised / polyester powder coated.
Walls	Ceramic tile to 2.3 m above floor level. Painted render above.
Doors	Solid GRP door sets, warranted for use in wet areas with factory fitted ironmongery.
Fittings	Sanitary ware.
	1no. Doc M toilet pack.
	1no. warm air hand dryer.
	1no. full-height safety mirror.
Post Swim Showers	
Floor	Designated wet floor with ceramic tile grade C slip resistant, (+40 pendulum in wet). Laid to falls to floor drainage gully on fine concrete screed, min thickness 75 mm, on continuous dpm on structural slab.
Skirting	Coved ceramic tile.
Ceiling	600 x 600 mm moisture resistant mineral fibre ceiling tiles in semi-concealed grid. Ceiling support system to be galvanised / polyester powder coated.
Walls	Ceramic tiles (full-height)
Doors	Solid grade laminate to match partitioning system with aluminium ironmongery.
Fittings	Shower heads served with pre mixed water activated by movement sensor.
	Doc M shower pack.
Pre Swim Showers	
Floor	Designated wet floor with ceramic tile grade C slip resistant, (+40 pendulum in wet). Laid to falls to floor drainage gully on fine concrete screed, min thickness 75 mm, on continuous dpm on structural slab.
Skirting	Coved ceramic tile.
Ceiling	600 x 600 mm moisture resistant mineral fibre ceiling tiles in semi-concealed grid. Ceiling support system to be galvanised / polyester powder coated.
Walls	Ceramic tiles (full-height)
Doors	-
Fittings	Shower heads served with pre mixed water activated by movement sensor.
	Doc M shower pack.

Pool Store	
Floor	Designated wet floor with ceramic tile grade C slip resistant, (+40 pendulum in wet). Laid to falls to floor drainage gully on fine concrete screed, min thickness 75 mm, water retaining concrete slab as pool surround.
Skirting	Coved ceramic tile.
Ceiling	-
Walls	Painted Blockwork.
Doors	Solid GRP door sets, warranted for use in wet areas with factory fitted ironmongery.
Fittings	Racking and shelving.
Pool	
General	Pool tank and surround construction is taken as reinforced water retaining concrete with tile on screed and render. Alternatively: • Stainless steel pool walls on concrete base with tiled concrete pool surround. • Proprietary sprayed concrete pool tank constructed to similar criteria as reinforced concrete with tile finish and tiled concrete pool surround. The pool tank profile is taken as being in compliance with Sport England Guidance. Alternatively, a moving floor with flap may be fitted to the pool, providing greater flexibility of use. Wall mounted insulated pool covers or insulation included into the movable floor. If it is intended that timing equipment be used, the pool tank length is to be adjusted to accommodate the timing pads and the tolerance on pool tank length is to be in accordance with the latest edition of the FINA Facilities Regulations.
Surround	Ceramic tile grade C slip resistant, (+40 pendulum in wet). Laid to falls to pool drainage channels on fine concrete screed, min thickness 75 mm. Pool drainage channels to accommodate the requirements of BS15288 part 1.
Pool tank	Ceramic tiles, on screed to concrete pool base and rendered concrete walls.
Skirting	Coved ceramic tile.
Walls	Ceramic tiles to 2.0 m above floor level. Render & paint above. Curtain walling to north elevation. Curtain walling to the north elevation of the swimming pool may have the option of electrically operated translucent privacy blinds fixed to the transoms at a suitable height and run in guides fixed to mullions. Blinds and mechanism to be suitable for use in the pool hall environment.
Doors	Internal - Solid GRP door sets, warranted for use in wet areas with factory fitted ironmongery. External – glazed aluminium frame doors as part of curtain walling. Solid GRP doors, warranted for use in wet areas with factory fitted ironmongery may be installed as an option to close the pool hall from the changing rooms at the end of the day.
Ceiling	Perforated aluminium liner sheet with acoustic quilt over as part of roof construction. Painted structural steelwork.
Fittings	Recessed pool steps with stainless steel handrails. Easy access steps with stainless steel handrails. Electric wheelchair lift / lifting plane to allow wheelchair users to access the water unaided. Lane rope holders / fixings. Halfway, false start, and backstroke markers.

Informal Viewing Area – Dry Side	
Floor	Ceramic tile. Slip resistance R9 with +40 pendulum in the dry. To comply with BS 5385.
Skirting	Hardwood / painted MDF.
Walls	Painted Plaster. Aluminium glazed screen.
Ceiling	Solid plasterboard.
Doors	Glazed aluminium framed doors as part of glazed screen construction.
Fittings	Optional addition of electrically operated translucent privacy blind fixed to the transoms at a suitable height and run in guides fixed to mullions. Blinds and mechanism to be suitable for use in the pool hall environment.
Informal Viewing Area – Wet Side	
Floor	Ceramic tile laid to falls to floor drainage gully on fine concrete screed, min thickness 75 mm, on continuous dpm on structural slab.
Skirting	Coved ceramic tile.
Walls	Ceramic tiles to 2.0 m above floor level. Render & paint above. Aluminium glazed screen.
Ceiling	Perforated aluminium liner sheet with acoustic quilt over as part of roof construction. Painted structural steelwork.
Doors	Glazed aluminium framed doors. Access controlled remotely from the reception desk.
Fittings	Mirror polished stainless steel (grade 316) and toughened laminated glass balustrade on tiled concrete plinth.
	Fixed tip up seating, warranted for use in a pool hall environment.
First Aid Room including accessible WC similar to that above	
Floor	Ceramic tile laid to falls to floor drainage gully on fine concrete screed, min thickness 75 mm, on continuous dpm on structural slab.
Skirting	Coved ceramic tile.
Walls	Painted Plaster.
Doors	Internal door - solid GRP door sets, warranted for use in wet areas with factory fitted ironmongery. External door - aluminium framed door.
Fittings	Kitchen wall and base fittings with inset sink.
	Lockable equipment store.
	Stretcher / trolley / bed.
	Chair.
Plant rooms	
Floor	Power floated concrete slab with dust inhibitor.
	Open steel grid with removable section.
Walls	Fair faced blockwork with dust inhibitor.
Doors	Solid core timber doors for paint finish with aluminium ironmongery.
Ceiling	Structure and soffit over.

Signage	
Internal	Directional signs: to design to suit operator and to be fully DDA compliant, taking into account the needs of the visually impaired.
	Fire safety signs and exit signs including illuminated signs to the satisfaction of the Building Control Officer.
	Health and Safety and instructional signs.
	Plant room signs by plant manufacturer.
	Braille incorporated in signs where appropriate.
External	Department of Transport compliant directional signs and road markings.
	Building labelling illuminated signs.
	Signs associated with accessibility to accessible parking spaces, drop-off points, facilities for assistance dogs, routes to main entrance and service yard.
	Braille incorporated in signs where appropriate.
Fixtures and Fittings	
	Allowance to be made for services and fixings for fixtures and fitting being provided by and scheduled by the building owner / operator.

Outline specification for external works

Area	Requirements
Subject to site specific requirements, but should be fully compliant with Sport England Guidance.	
Car parking and access roads	Car parking and access roads to include all necessary drainage, kerbs, edgings, and dropped kerbs for wheelchair access. To be to the specification of the Civil Engineer. To be constructed capable of taking vehicular loads from all vehicles likely to access the site including emergency services such as fire tenders and mobile ladders, pool chemical deliveries and refuge collections.
	All parking areas will be white lined with thermoplastic paint including directional arrows, traffic markings and parking bays. Disabled parking bays to Sport England 'Accessible Sports Facilities' standard and to be demarcated in yellow thermoplastic paint adjacent to the entrance.
External paving generally	Epoxy bonded gravel including inset concrete setts and concrete slabs with drop curbs and other features to Sports England 'Accessible Sports Facilities' standard.
Soft landscaping generally	Shrub planting, hedgerows and grassed areas.
Hard landscaping generally	New external walls and retaining walls, as required by proposed development and existing ground levels.
Lighting generally	External illumination of vehicular and pedestrian accessible areas utilising lighting columns of type, size to suit location. All lighting levels to be subject to the approval of the Local Authority and Planning Authority.
Other requirements	Rest area for assistance dogs.
	Covered cycle parking with provision for securing cycles using D shackles.

Appendix 3
Structural Design

The following has been assumed for the indicative designs and cost estimates:

Assumptions

The following values to be used during Stage C initial design phase for the structural design:

- **Ground conditions:** The soil to be well compacted, medium-dense sand and gravel, homogeneous across the site with bearing pressure of 150 kN/m^2. The following values to be assumed in calculations: soil density = 19 kN/m^3, angle of shearing resistance = 35°.
- **Ground water conditions:** The lowest level of the foundations to be above the ground water table and the effect of structure uplift due to water pressure from underneath to be considered on a site by site basis.
- **The foundation design** for the building to be site specific. The specific ground conditions will vary between sites and will therefore need to be confirmed on a site by site basis through a bespoke site investigation. The foundation systems to be re-appraised and designed as required for each site to reflect the unique site conditions encountered.
- **The basic snow loading:** The snow load to be used in calculations = 0.6 kN/m^2. This is to be taken from BS 6399: Part 2 and able to cover over 85% of England. Local areas with higher loading requirement to be addressed on a site specific basis.
- **Wind conditions:** The following values to be used in calculations: basic wind speed = 23 m/s, site altitude = 300 m, effective height of the building = 6.5 m, dynamic pressure = 1.5 kN/m^2.
- **Steel grade for structural elements** = S355 (py = 355 N/mm^2), steel density = 78.5 kN/m^3.
- **Steel grade for reinforcement** = 500B (fy = 500 N/mm^2).
- **Concrete grade** = C32/40 (fcu=40N/mm^2), reinforced concrete density = 24kN/m^3.

A structural approach to allow flexibility, economy and speedy construction.

General engineering requirements

Lateral movement

The lateral movement of the structure to be controlled in order to:

- Maintain the strength and stability requirements of the structure
- Avoid fatigue in structural members and connections caused by fluctuations in lateral loads
- Avoid degrees of lateral deflection that may cause cracking of internal partitions, finishes, and external cladding, in serviceability conditions.

The lateral movement requirements to apply for wind effects and minimum notional loads as defined in relevant design standards.

Differential movement

Differential movement to be realised vertically on the structural form proposed by the vertical loads applied to the foundations by the structural frame and to the pool base by the pool water. It is recommended that the swimming pool shell plus its surrounding deck to be constructed monolithically and to be isolated from the rest of the reinforced concrete structure through the provision of a perimeter structural movement joint.

The movement joint in this instance to be principally required to take account of the differential vertical movement which is likely to occur due to the pool tank being laid on the compressible thermal insulation. The design of this movement joint will avoid introducing unmanageable stresses through direct forces applied to the swimming pool tank, which are likely to manifest as the tank is filled with water and emptied for maintenance purposes. The movement joint to also allow the contractors to build the pool independently of the structural foundations and frame.

Settlements

The maximum expected settlement of foundations to be 25 mm. The maximum differential settlement to be calculated considering the angular distortion between two points, checking it is not greater than 1/1000. The maximum differential settlement to not exceed 15mm in any case.

Thermal effects

The seasonal temperature change to be used in the detailed calculation of stresses and strains acting upon the structure to be taken as normal parameter for England and varies from –5 °C to +35 °C. The actual range, however, depends on

the site location and advice to be taken from the Meteorological Office.

Tolerances

Tolerances to be as per BS 6954 (BS 6954-All parts: 1988 - Tolerances in Buildings).

Fire requirements

The structural form and the materials specified to be afforded sufficient fire protection.

Structural elements within the basement, ground floor plant room and in the mezzanine plant room to comply with 60 min fire resistance. To conform with this criteria, the minimum 20 mm cover to reinforcement to be provided for reinforced concrete elements such as columns, walls and slabs. Appropriate intumescent paint finishes to the steelwork elements to also be provided.

Anti-corrosive protection

Concrete elements to be designed and specified with suitable cover to the reinforcement.

Where structural steelwork is exposed, suitable fire and corrosion protection to be provided in association with concrete encasement and painting.

The concrete for encasement to have the correct composition and compaction with a depth of cover appropriate for the environment (to BS8500).

Where steel elements are partially embedded in concrete, extra protection to be applied at the steel-to-concrete interface by means of an alkali resistant paint at the junction, or an alkali resistant mastic.

The mezzanine plant room above toilets in the wet changing room area to be protected against corrosion.

Design standards and criteria

Serviceability limits

The following serviceability limits to be used in the design of the structure:

- **Vertical deflection of elements:**

  All horizontally spanning elements (Slabs, Beams, etc.) to not deflect in excess of Span / 250 under Dead and Live load or Span / 360 under Live load alone.

- **Horizontal deflection of elements:**

  Overall structural horizontal deflection under lateral loading, from the wind or notional forces, to not exceed height / 500.

If proprietary cladding systems are used, the horizontal and vertical deflections should be confirmed by the cladding system manufacturer.

Earth and hydrostatic pressure effects

The horizontal force induced on the lower plant room retaining walls to be calculated based on the static self-weight of the retained soil plus a surcharge of 10 kN/m².

The horizontal force induced on the swimming pool tank walls to be calculated based on the hydrostatic pressure arising from any elevated water table.

The magnitudes of the earth pressure acting on retaining structures to be calculated based on findings and recommendations from the soil investigation report.

Materials

Strength and specification of concrete

The design of all in-situ concrete elements to be based on the following concrete grades and reinforcement specifications:

Element	Concrete Grade (N/mm²)
Sub Structure - Basement	
Ground slabs	40
Pad and Strip foundations	40
Water tanks	40
Retaining walls	40
Super Structure	
Slabs	40
Columns	40

Conventional reinforcement used in the concrete to have yield strengths of minimum 500N/mm² for high yield tensile reinforcement.

Concrete to be tested in accordance with requirements of the codes listed on page 48. All testing to be carried out by an approved independent testing laboratory.

Strength and specification of steelwork

The grade of steel used is to meet the requirements of BS 5950: Part 1 (2000) and BS –EN -10025. Strength class S355 for hot rolled sections, bars and plates will be specified.

Design codes

The following are the principal 'Design Codes of Practice' to be used in the design of the structures:

Subject	Standard / Code	Relevant Sections
Loadings	British Standards	BS 648 (1964) - Schedule of Weights of Building Materials.
		BS 6399: Part 1 (1996) - Code of Practice for Dead and Imposed Loads.
		BS 6399: Part 2 (1997) - Code of Practice for Wind Loads.
		BS 6399: Part 3 (1988) - Code of Practice for Imposed Roof Loads.
	Eurocodes	BS EN 1990 - Eurocode: Basis of Structural Design.
		BS EN 1991 - Eurocode 1: Actions on Structures – Part 1-1: General actions – Densities, Self-weight and Imposed Loads.
		BS EN 1991 - Eurocode 1: Actions on Structures – Part 1-3: General Actions – Snow Loads.
		BS EN 1991 - Eurocode 1: Actions on Structures – Part 1-5: General Actions – Thermal actions.
		BS EN 1991 - Eurocode 1: Actions on Structures – Part 1-6: General actions – Actions during Execution.
		BS EN 1991 - Eurocode 1: Actions on Structures – Part 4: Silos and Tanks.
Concrete	British Standards	BS 8110: Part 1 (1997) - Structural Use of Concrete, Code of Practice for the Design and Construction.
		BS 8110: Part 2 (1985) - Structural Use of Concrete, Code of Practice for Special Circumstances.
		BS 8110: Part 3 (1985) - Structural Use of Concrete, Design Charts.
		BS 8500: Part 1 (2006) - Structural Use of Concrete, Methods for Specifying Concrete Mixes.
	Eurocodes	BS EN 1992-1-1 - Eurocode 2: Design of concrete structures - Part 1-1: General Rules and Rules for Buildings.
		BS EN 1992-3 - Eurocode 2: Design of concrete structures – Part 3: Liquid Retaining and Containment Structures.
Steel	British Standards	BS 5950: Part 1 (2000) - Structural Use of Steelwork in Buildings, Code of Practice for Design of Rolled and Welded Sections. Simple & Continuous Construction.
		BS 5950: Part 2 (2001) - Structural Use of Steelwork in Buildings, Code of Practice for the Specification of Materials, Fabrication and Erection.
	Eurocodes	BS EN ISO 12944: Parts 1 to 8 - Paints and Varnishes - Corrosion Protection of Steel Structures by Protective Paint Systems
		BS EN ISO 14713 - Protection Against Corrosion of Iron and Steel Structures - Metal Coatings - Guidelines

Masonry	British Standards	BS 5628: Part 1 (2005) – Code of Practice for The Structural Use of Unreinforced Masonry
		BS 5628: Part 3 (2005) – Code of Practice for the use of Masonry; Materials and Components, Design and Workmanship
	Eurocodes	BS EN 1996 - Eurocode 6: Design of Masonry Structures
Sub Structure	British Standards	BS 8002 (1994) - Code of Practice for Earth Retaining Structures.
		BS 8004 (1986) - Code of Practice for Foundation Design.
		BS 8007 (1987) - Code of Practice for Water Retaining Structures
	Eurocodes	BS EN 1997 - Eurocode 7: Geotechnical Design – Part 1: General rules

Durability

In order to ensure sufficient protection against corrosion and fire the following cover over reinforcement to be allowed for in the design of the concrete elements:

Element	Concrete Cover (mm)
Ground slabs	30
Pad and strip foundations	30
Water tanks & swimming pool shell	40
Retaining walls	30
Suspended slabs	30
Columns	50

Building design loading

Vertical loads

- Dead loads (structural self weight)
- Superimposed dead loads (floor finishes / ceilings / services / non-structural walls / building envelope)
- Live loads (occupancy loads / flexible partitions)

Imposed (live) load schedule

The following table details the loading schedule for all the vertical imposed loading:

Floor Loadings in kN/m^2 at SLS (Unfactored)	
Area usage	**Live Load**
Office	5.0
Reception	5.0
Entrance foyer	5.0
Changing rooms, showers & toilets	5.0
Pool surrounds	5.0
Ground floor plant room	7.5
Basement plant room	7.5 + extra weight of sand filters *
Mezzanine plant room	7.5
Chemical store	4.0

* weight of sand filters will be applied to basement slab as localised point loads from filter stands.

Structure

The foundations, basement, ground floor slabs, swimming pool slabs and walls to be constructed with in-situ concrete.

The main frame to the single storey building to be a steel frame. The roof beams over the swimming pool area to be steel cellular profiles with an option of glulam timber sections to the pool hall.

Foundations

The size of pad and strip foundations to depend on the detailed site specific ground investigation.

For the assumed ground conditions a system of pad and strip foundations to be provided to transfer vertical loads from the building to the ground. Generally reinforced concrete pad foundations to be required to support the steel columns with reinforced concrete strip foundations running between the pads to support the external walls and suspended reinforced concrete slabs.

The swimming pool and balance tanks to be supported directly onto a proprietary rigid insulation product, to sit directly on the ground. The vertical loads from the pool to be directly transferred into the supporting ground.

Pad foundations to the pool area to be constructed below the pool tank level to allow the pool tank to be constructed independently from the frame.

Basement plant room structure

The basement plant room structure to consist of a reinforced concrete ground bearing slab, reinforced concrete retaining walls and suspended reinforced concrete ground floor slab over.

The basement plant room structural walls to be constructed in a variety of ways depending on the contractor's preferred method of working:

- open dig with reinforced concrete walls formed off base slab
- contiguous concrete piled wall with placed sprayed structural concrete facing wall
- temporary sheet piling with concrete facing wall
- steel sheet piling with exposed steel face (with necessary fire protective coating).

Reinforced concrete columns to be used to support the ground floor plant room slab.

The ground floor plant room slab to be generally a suspended reinforced concrete slab and have a removable floor section required for plant maintenance and replacement. This floor section to consist of standard steel universal beam

sections and standard steel angle. The angle to be fixed to the edge of reinforced concrete slab along the perimeter of the void. The beams to be fixed to the slab edge in a way that is to allow for their fast and easy removal.

The basement plant room structure to be fully tanked. The tanking to be achieved either by a waterproof barrier applied externally or internally or, by structural integral protection by the use of waterproof concrete coupled with waterbars at construction joints.

Swimming pool and balance tank

The swimming pool and balance tank structure to consist of reinforced concrete ground bearing slab and reinforced concrete walls.

The reinforced concrete pool and balance tank structure to be designed to BS8007 to provide a water retaining tank without the requirement for any external tanking. The reinforcement to be designed to limit the crack width to 0.2 mm.

If the pool and balance tank is designed to BS EN 1992-3 then the crack width will have to be limited to 0.13 mm and the reinforcement to be designed accordingly to meet this requirement.

A specialist designed steel tank or sprayed concrete tank - to satisfy the same criteria as in-situ reinforced concrete - could be used in lieu of a concrete pool tank, as the pool can be constructed independently to the main structure (i.e. foundations and frame).

All exposed surfaces of the pool base and pool walls to be mechanically keyed (scabbled) to remove the surface laitance and expose coarse aggregate ready to accept finishes.

The perimeter of the pool hall, wet area floor slab and any manhole penetrations through the slab into a plant room, to have a monolithic concrete up-stand cast to 150 mm above finished floor generally, and to within 20 mm of finished floor level at openings. This will prevent water trapped within the pool surround screed draining into adjacent areas.

Ground floor slabs

All ground floor slabs will be designed as suspended to span between the strip foundations or between strip foundations and the pool wall. Pool surround to be water retaining concrete.

The ground floor slabs to be fully tanked. The tanking to be achieved either by a waterproof barrier applied externally or internally, or by structurally integral protection by use of waterproof concrete coupled with waterbars at construction joints.

A damp proof membrane to be applied to all ground floor slabs, suitable for the design of the slab and in any instance not less than 1200 gauge fully recycled polyethylene.

Steel frame

A single storey steel frame to consist of a set of columns and beams supporting the roof structure. The structure to be a braced frame and all beam-to-column as well as beam-to-beam connections to be designed with a pin joint.

The horizontal and vertical element sizes to vary across the building depending on the span and applied loads.

Horizontal elements:

The beams over the swimming pool to be cellular. The primary and secondary beams over the ground floor plant room, changing rooms and reception lobby to be universal steel beams (UB) sections.

The primary roof beams over the pool area may be constructed of timber. In such instances they will be glulam timber sections supported on steel columns.

Vertical elements:

The columns in wet changing room areas and columns on the interface between pool area and ground floor plant room to be concrete encased standard steel universal column (UC) sections. The columns in reception lobby and office to be standard steel universal column sections without concrete encasement. The columns in pool area at the south face of the building to be circular hollow sections (CHS), or other sections matching the properties of CHS's, with concrete encasement of minimum 150 mm above finished floor level at the base.

Mezzanine plant room floor (above changing room areas)

Reinforced concrete slab to be provided to support air treatment units above the changing rooms to the south side of the building. The concrete deck to sit on UB steel beams spanning between columns within the south walls and hangers hung from the primary and secondary roof beams. The columns supporting the plant room mezzanine floor to be UC concrete encased standard steel sections. The hangers to be UC standard steel sections. All structure to be 1 hour fire resisting.

Roof structure

A proprietary perforated aluminium insulated structural roof deck to be provided, spanning between main steel roof beams. This removes any requirement for the use of purlins. The roof membrane to be capable of transferring lateral forces along the deck's troughs. This particular aluminium deck together with the building geometry and large roof lights does not allow transferring lateral forces acting perpendicular to the deck's troughs. The additional horizontal bracing system below the roof membrane to be designed to provide the diaphragm action.

The bracing system to the roof structure to consist of circular hollow section (CHS) raking beams just below the roof membrane connected to steel columns at one end and to the lower level rectangular hollow sections (RHS), spanning between primary roof beams, at the other end.

Roof lights to be designed by specialists. The supporting structure to consist of standard steel universal beam sections (UB) spanning between the primary roof beams. Additional steel elements will have to be fixed to the UB sections to equalise the top steelwork levels of supporting structure around its perimeter.

Stability system

The overall stability of the building to be provided by the bracing system in the form of crossed flat plates located in several places across the building The lateral forces to be transferred from external cladding to the columns and beams along building's external envelope and then through the diaphragm action of the roof membrane to the braced bays. Flat plates to be used so that they can be positioned within the cavity walls.

Wind posts

The wind posts to be required in some areas where there is window or door openings punching through the cavity walls. The wind posts to be proprietary products made of stainless steel and fixed between reinforced concrete ground floor slab and upper steel beams.

Wall head restraints

Wall head restraints to be provided for all walls and to be the proprietary products made of stainless steel and fixed to the underside of roof membrane or steel beams.

Structural and construction joints

The pool tank and its surrounding slab to be separated from the rest of the reinforced concrete structure through the 25 mm thick structural

movement joint. The movement joint to have a waterbar to stop water ingress between concrete elements. A slip membrane between strip / pad foundations and pool ground floor slab to be provided to allow them to move independently.

Construction joints to be provided during the construction of the reinforced concrete tank structure. The waterbars to be provided wherever there is a brake in the concrete pour. No construction joints are allowed in the pool base slab and in the pool walls. These elements to have to be poured monolithically.

Below ground drainage

Surface water

Depending on the site and surrounding drainage infrastructure, surface water may discharge to a:

1. Public sewer
2. Water body / river
3. Infiltration to ground (depending on ground conditions)
4. Combination of the above.

The drainage strategy for the site to maximise the use of sustainable techniques in accordance with best practice. Sustainable Urban Drainage Systems (SUDS) to be designed to reduce the potential impact of new and existing developments with respect to surface water drainage discharges.

SUDS replicate natural systems that use cost effective solutions, with low environmental impact,

to drain surface water run-off through: collection, storage and cleaning before allowing it to be released slowly back into the environment.

In all cases (1 - 4 above), the previous use of the site ('green-field' or 'brown-field') will inform estimates of discharge rates and the surface water storage and location requirements.

1. Public sewer

Discharging surface water to a public sewer to depend on the location and invert of the sewer relative to the site - information which can be readily obtained from the Public Sewer Authority. An important consideration to be whether the site can drain by gravity or whether pumping is necessary.

The Public Sewer Authority typically confirms (following consultation at RIBA Stage C/D) what the allowable discharge rate will be.

2. Water course / river

Discharging surface water to a water course requires approval from the Environment Agency (EA), or Drainage Board as appropriate, and depends on the location and invert of the watercourse.

Consideration to be given to implementing robust pollution prevention measures, treatment of the runoff from paved areas and flood risk. Discussions to take place with the EA/Board at RIBA Stages C/D following design freeze, to gain an understanding of the design and environmental constraints including discharge rates and the estimated attenuation volume.

3. Infiltration to ground

When appropriate, discharging surface water to ground water is highly desirable, not least from a sustainability point of view. This approach to be considered when developing the SUDS strategy for the site. Knowledge of the underlying geology and infiltration tests are required to determine the feasibility of this approach. Important consideration to be given in the strategy to implementing robust pollution prevention measures and treatment of the runoff from paved areas. Discussions to take place with the EA at RIBA Stages B/C/D to gain an understanding of the design and environmental constraints and to determine whether a groundwater protection zone lies close to the site.

Foul water

Discharging foul water to a public sewer depends on the location and invert of the sewer relative to the site - information which can readily be obtained from the Public Sewer Authority. Important considerations include: whether the site can drain by gravity or whether a pumping station will be required.

The Public Sewer Authority to typically provide (at RIBA Stage C/D) confirmation of the available capacity in the system to service the development. Should there be insufficient capacity available, a sewer may be requisitioned (at a cost to the developer), provided it serves two or more properties.

Flood risk

A flood risk assessment (FRA) to depend on where the site is located (Flood Risk Zone 1, 2 or 3) and the development site area, as described in Planning Policy Statement 25. A development site area of 1 hectare or greater automatically requires a FRA.

For sites less than 1 hectare in Flood Zone 1, a formal FRA will not usually be required (see Table D1 of Planning Policy Statement 25 - PPS25). In these cases, applicants to refer to the standard comments on managing surface water drainage as set out in the Environment Agency's standing advice on development and flood risk.

Appendix 4
Energy and Sustainability

The following has been assumed for the indicative designs and cost estimates:

Local planning criteria

The local authorities renewable energy strategy needs to be ascertained as part of the overall energy assessment for the site, as this may differ from one authority to another.

Building Regulations: Part L2A 2010

The new construction to be designed in compliance with the new building regulations for the conservation of fuel and power in non domestic buildings. This document came into force for all buildings that do not have a Building Control application lodged or started on site by 1st October 2011 [15].

A Part L model and assessment is required as part of the building regulation approval.

Thermal transmittance

Account to be taken of the *Approved Document L2A (Conservation of fuel and power – new buildings other than dwellings 2010)* in preparing the U-values to be achieved.

Element	U-value (W/m^2.K)
Walls	0.28
Roof	0.15
Floor	0.2
Doors and windows	1.76
Pool Tank	0.25

Air permeability

The maximum allowable figure under the current legislation to be 10 m^3/hour/m^2, however, the more airtight the building the less heating energy is required. Therefore the target to be a maximum of 5 m^3/hour/m^2 with the aspiration of reducing this. The air permeability to be predominantly down to the standard of construction and building services sealing, to be derived from best practice.

The UK's commitments to delivering environmentally sustainable development should be embraced from the outset.

BREEAM

The development to be assessed under the BREEAM criteria and achieve a minimum rating of a "Very Good". The scheme to achieve a good reduction in CO^2 emissions in line with the current building regulations and local planning requirements.

The following items to be incorporated to assist in attaining BREEAM credits:

- Combined heat and power system using low carbon technologies to assist with carbon emission abatement
- Photocell, PIR and zoned lighting controls to reduce electricity consumption
- Inverter controls incorporated into every pump and fan system to ensure flow is matched with the power required
- Cross flow plate heat exchangers incorporated into every air handling unit to reduce the heat input required to the building
- Energy efficient lighting to be incorporated throughout the building
- Solar glare control to be incorporated into those areas which require occupancy control and any privacy control
- Appointed contractor to achieve considerate contractors credits
- Optimisation of natural daylighting
- Local sourcing of materials.

No passive ventilation measures to be utilised in this building.

Pool Covers: The indicative designs allow for insulated pool covers to be fitted on the side walls of the pool hall(s) and the costs are included in the *Capital costs overview* on page 15.

[15] The U-values are 20% better than the minimums given in the new part L 2010 of the building regulations. However, high levels of insulation in the building fabric could be considered and appropriately modelled to further reduce energy consumption.

The following items to be incorporated as options:

- Grey and rainwater harvesting systems to be considered for W.C. flushing within the development
- Photovoltaic system
- Solar thermal domestic hot water system
- Heat recovery of pool water when discharged to enable a pre-heat for the incoming top-up water
- Green / sedum roof could be incorporated to enhance bio-diversity credits with structural amendments
- Waste recycling.

Metering

In order to comply with the current Building Regulations (Part L), secondary meters to be installed as required where the rated input power exceeds that tabulated below:

- Boiler installation serving a common distribution circuit: 50kW
- Motor control centres: 10kW.

Building environmental performance

The Mechanical & Electrical services to be provided so that the building will achieve low CO^2 emissions per m^2 per annum as classified by the Energy Efficiency Office of the Department of Environment and the Chartered Institute of Building Services Engineers.

This to also include compliance with the criteria as set out by the Local Authority's Policy Statement. Detailed Energy calculations as required will be undertaken at Stage E.

The design of the mechanical and electrical services to be considered in order to reduce CO^2 emissions in line with the requirements of the current Building Regulations.

Appendix 5
Building Services

The following has been assumed for the indicative designs and cost estimates:

General

Access & maintenance

The access and maintenance requirements of the engineering services to be considered during the outline scheme stage. This includes the legal requirements of modern design and construction, good practice design methods and plant replacement strategies.

Risk assessments for any residual hazards to be completed as part of the final scheme design.

Access for major plant replacement to be established in principle. Lifting equipment, provided by a specialist lifting company for the removal of any large pieces of equipment, to be considered due to the limited space available.

Statutory supplies and services provision

Statutory authority existing utility services information to be obtained for each site. Following receipt of this existing information, new supplies suitable for the development to require an application. Any requirement for service disconnections to be undertaken and the services removed.

Electrical supplies

A supply capacity as indicated below to be anticipated to satisfy the demand of the proposed sites:

4 Lane pool	100 kVA
5 Lane pool	110 kVA
6 Lane pool	120 kVA
6 Lane pool with secondary pool	120 kVA
8 Lane pool	135 kVA
8 Lane pool with secondary pool	135 kVA

The supply to be either taken from the existing LV infrastructure or from the Local Supply Authority. The supply to be 400V 3 phase and neutral. The supply is not required to be backed up via a standby generator.

Gas supplies

A suitable incoming natural gas service to be provided for the development. Preliminary estimates indicate the following supplies required:

4 Lane pool	990 kW
5 Lane pool	1200 kW
6 Lane pool	1450 kW
6 Lane pool with secondary pool	1750 kW
8 Lane pool	1850 kW
8 Lane pool with secondary pool	2100 kW

Building services should be suitable for the demanding internal environment required for a swimming pool.

Water services

A suitable incoming water service to be provided for the development. Preliminarily estimates indicate a supply capable of:

4 Lane pool	5 l/s
5 Lane pool	6 l/s
6 Lane pool	7 l/s
6 Lane pool with secondary pool	7 l/s
8 Lane pool	8 l/s
8 Lane pool with secondary pool	8 l/s

All incorporating an allowance for pool top up water as well as domestic hot water and cold water service requirements (flow rates to be confirmed during detailed design).

Telecommunication service provider connections

A total of two cable ducts to be allowed for the development, one for BT and one for cable companies.

Each of the ducts to run to the data / comms position within the plantroom for the future installation of telecommunications cabling. The ducts to conform to the specific requirements of the telecommunications companies with regards to construction and installation.

Draw wires to be installed as necessary and the ends of the ducts adequately weatherproofed at the time of installation. Draw pits to be provided where necessary for the installation of the telecommunication services.

Public health services

Codes and standards

The public health services to be designed in accordance with current legislation and regulations and will also consider the following industry codes and guidelines:

- Government legislation, regulations, requirements and byelaws
- Local Authority, Fire Officer, Utility Company statutory regulations and requirements
- Chartered Institute of Building Services Engineers documentation (CIBSE)

- Building Services Research and Information Association documentation (BSRIA)
- British Standards and European Norms
- Institute of Plumbing Guidelines
- Electricity at Work Regulations
- Health and Safety at Work Act
- Current Building Regulations Approved Documents
- Local Authority Requirements
- Institute of Gas Engineers Documentation
- Gas Safety Regulations
- WRAS Water Supply (Water Fittings) Regulations.

System	Design Criteria
Foul and surface water drainage	BS EN 12056 and BS EN 752. Foul water flows based on discharge unit method of calculation. Maximum hydraulic depth of flow 0.75. Velocity of flow 0.75 to 1.2m/sec.
Rainwater drainage	BS EN 12056 Part 3 Category 2 level of protection. Storm return period 1.5 x life span of building.
Incoming domestic cold water supplies	Sized to replenish volume of cold water storage tanks in a 3 hour period with a maximum velocity of flow of 1.5 m/sec.
Domestic cold water storage	Break/ Storage tank provided equating to enable supply of peak demand in accordance with BS6700: 1997 and the IOP loading unit method. Break/ Storage tank provided equating to enable supply of peak demand in accordance with BS6700: 1997 and the IOP loading unit method.
Hot and cold water pipework distribution	BS6700: 1997 and the IOP loading unit method. Maximum velocity of flow restricted to 1.5 m/sec.
Above ground sanitation	BS EN 12056 Part 2 System 1 based on a frequency factor of 0.5.

The proposed building to comprise both gravity and pumped drainage systems to convey foul and surface water discharge from the building to the external public sewerage network.

All fittings beneath ground level to discharge to local pumping stations and be pumped to connect to the gravity drainage network, to ensure that the buildings drainage systems are effectively isolated from any surcharge conditions in the public sewerage network.

All areas above ground level to discharge via gravity and connect to new sewer connections. The new sewer connections to connect to the existing public sewerage networks.

Drainage to be provided to serve the following areas at lower levels within the building:

- Surface water cut off channels at points of entry and exit to the building design by the below ground civil engineer
- Local drainage systems to washdown / wet areas
- Air intake shafts and wells that may permit the ingress of rainwater
- Service loading areas, to incorporate a suitable petrol interceptor design by the below ground civil engineer
- At this stage no provision to be made for groundwater drainage systems - these to be considered by the below ground civil engineer
- Drainage for and around pool by below ground civil engineer
- Ground and basement plant areas to be provided with gullies and drainage inlets for connection by below ground civil engineer
- All surface drainage for toilet and changing areas by below ground civil engineer
- Pool specific services by pool specialist.

Above ground sanitation systems

The sanitation and rainwater systems to be designed to comply with local authority requirements and the local system network. Disconnecting traps to be provided on both foul and surface water drainage systems to prevent the egress of foul air from the public sewerage network.

The sanitation systems to operate by means of gravity serving all fittings from ground level and

above. Pumped drainage systems to be provided for all fittings located beneath ground level, thus protecting the building from any potential surcharge conditions that may occur within the external public sewerage network.

Soil / waste stacks with anti siphon/relief vents to collect discharges from all fittings associated with the development. All vent pipes to terminate through the roof and discharge to the atmosphere.

Where required trade waste (i.e.chemical stores) to be designed (e.g. to allow for chemical filtration for outfall from chemical stores) in accordance with local authority requirements and Building Regulations such that grease traps and separators to be provided on drainage connections serving catering and food preparation areas, to ensure that the buildings drainage system does not accumulate fat or oil deposits.

Above ground rainwater systems

The rainwater systems to be designed to comply with local authority requirements and sewer connections.

The rainwater systems to be designed in accordance with BS EN 12056 Part 3 with a Category 2 level of protection. For the purposes of roof drainage design only a set rate of 150 mm / hour rainfall intensity to be adopted.

Surface water drainage including rainwater outlets, hoppers, drains and gutters to be provided to serve roof areas.

Potable cold water distribution for domestic purposes

Discreet cold water storage, treatment and pumping facilities to be provided to supply potable water to the pool, showers and toilets. The plant room location is indicated on the architectural layouts above the changing facilities.

Hot water generation and distribution

Discreet hot water generating plant to be provided to serve the showers and toilet areas. The plant room location is indicated on the architectural layouts above the changing facilities.

The development to be provided with buffer vessel and plate heat exchanger packages such that hot water may be generated indirectly and stored. The heat source for hot water generation to be provided via LTHW primary flow and return pipework that emanates from the proposed new energy centre plant.

The hot water make up supply to the hot water system to be supplied from the potable bulk cold water storage tank.

To maintain adequate storage and distribution temperatures of hot water the hot water system within the development to either be arranged as a recirculation (2 pipe) system or as a single distribution pipe complete with automatically controlled heat regulating tape. The stored water temperature and distribution to be maintained at 60°C.

Outlet temperatures for washing facilities to be limited to a maximum of 43°C via the inclusion of local thermostatic mixing valves at the point of use.

Below ground drainage

All below ground drainage, including that for the pool, main building facilities, car park and external areas to be provided by the civil and structural engineers. Attenuation maybe required to meet the requirements of the statutory providers and local authorities.

Mechanical services

Design criteria

The design of the mechanical services to be based upon the following design criteria. Each of the identified criteria to be in accordance with current good practice design and as recommended by the CIBSE, IEE, Building Regulations and British Standards.

External Design Conditions		
Summer	For sizing cooling installations:	29°C dry bulb/20°C wet bulb
	For sizing of air cooled condensing units and adiabatic heat rejection plant:	35°C dry bulb
Winter	For sizing heating	-5°C/100% RH
	For sizing protective installations (e.g. trace heating, antifreeze concentrations, etc):	-15°C/100% RH
	Air Frost Projection Coils	-10°C/100% RH

Internal Design Conditions		
Pool Hall, changing and ancillary areas:		
Summer	30°C	Via Mechanical Ventilation max. 60% humidity
Winter	30°C	Via Mechanical Ventilation max. 60% humidity
Offices:		
Summer	24°C +/- 2°C-	Via Mechanical Ventilation max. 60% humidity
Winter	24°C +/- 2°C-	Via Mechanical Ventilation max. 60% humidity

- Occupancy Densities

  Refer to Sport England Design Guidance

- Ventilation Rates / Outside Air Provision

  10-12 l/s/person to mechanically ventilated and comfort cooled areas. Pool hall ventilation to be based upon CIBSE recommendations (10 l/s/m²) changing / ancillary areas based upon 6-8 air changes per hour.

  The pool hall to be sufficiently ventilated via dedicated air handling plant suitable for high humidity levels and corrosive environments.

  Toilets and changing areas to be provided with 6-8 air changes/hour extract. Fresh air make up is proposed via a dedicated toilet and changing areas air handling unit.

- Air filtration

  Supply air to all mechanically and ventilated areas to be filtered:-

  - Pre-filter 85% arrestance to BS 6540 (EU4)
  - Main filter 60% average dust spot efficiency to BS 6540 (EU7)

- Noise criteria

  External noise criteria still to be established (subject to noise assessments and the requirements of the local authority)

  The internal noise criteria and background noise levels generated by the building services and installation for various areas to be in accordance with the CIBSE recommendations:

Swimming pool:	NR 40-50
Changing areas:	NR 35-45
Office areas:	NR 35

  The internal and external noise criteria for the building services to be established in consultation with any appointed Acoustic Consultant.

Ventilation

- Boiler Room, CHP and plant room ventilation

  Performance Objective

  Air supply and extract ductwork to provide air to the CHP plant for ventilation and combustion complete with a fan sufficiently powerful to overcome system resistances. An allowance for natural ventilation for the main boiler plant room to be made via the high and low level louvres in accordance with BS 5440-1:2008.

  Design parameters

  The ventilation rate to meet combustion and ventilation requirements for the gas fired boilers, CHP and Plant Rooms.

  System description

  Supply and exhaust ductwork and plant to be located in the plant room to provide general ventilation to the boiler room from the air intake and discharge louvres in the plant room sidewall as well as a dedicated ducted system for the CHP generator.

  The system to consist of the following:

  - Fire rated ductwork
  - Fans to be fire rated, mounted on anti vibration mountings complete with inlet & discharge main attenuators
  - All supply and extract fan motors to be inverter driven
  - Air intake connections to external louvre complete with bird mesh
  - Pressure drop across each louvre not to exceed 50 pa
  - Low velocity distribution ductwork and associated accessories including fire dampers, volume control dampers etc to be fitted with anti-vibration supports and hangers
  - All ducts to have access panels for cleaning at 3m intervals and either side of any obstructions in the ducts
  - Supply grilles mounted at high level and low level as required
  - All associated controls and interlocks
  - Air to be exhausted through an exhaust louvre located in the external wall.

Ventilation and air conditioning

All required ventilation and air conditioning for the development to be identified and suitable plant space to be allocated. Air handling units to be accommodated within the plant areas indicated on the architectural drawings. Acoustic attenuation and odour control to be subject to planning approval and the local Environmental Health Policies.

The systems to consist of the following:

- Air handling plant to be complete with cross flow plate heat exchangers, panel filters, heating coil, access sections, supply and extract fan sections including attenuation and inlet and discharge main attenuators
- All AHUs to incorporate a channel base and to be mounted on anti vibration mountings
- All AHU and extract fan motors to be inverter driven
- All extract fans to be complete with acoustic and vibration attenuation
- Air intake and exhaust connections to external louvres to be complete with bird mesh
- Pressure drop across each louvre not to exceed 50 pa
- Low velocity distribution ductwork, associated accessories including fire dampers, volume control dampers etc and all on anti-vibration supports and hangers
- All ducts to have access panels for cleaning at 3 m intervals and either side of any obstructions in the ducts
- Pool hall supply grilles to be mounted at low level within a dedicated upstand at the

external perimeter, complete with volume control dampers beneath. The return air is to be removed via an open duct complete with a baffle plate 200 mm larger than duct opening

- All associated controls and plant integration
- Air to be drawn in via external wall louvres complete with bird guards / mesh and exhausted via roof cowls through the roof above
- All ductwork, air handling units and associated equipment to be suitably treated for chlorinated and aggressive atmospheres.

Natural gas

- Performance objective

  Natural gas to be provided to the boiler and CHP plant room to meet the maximum simultaneous demand for the heating and hot water requirement to comply with the requirement of the Institute of Gas Engineers IGE/UP/2 & 3.

- System description

  The system to consist of the following:

  - A new gas supply connection from the existing utility infrastructure to a boundary placed gas meter enclosure, building supply direct to the boiler/ CHP plant room to incorporate a BMS monitoring facility
  - Provide an automatic isolation fire valve on the new gas supply operated by Building Fire Alarm System
  - A gas distribution system to be provided to serve new low temperature heating boilers with a branch allowance for connection to enable a gas fired CHP
  - All pipe work to be distributed via ventilated risers and ceiling voids
  - The gas supply to boiler room and CHP plant room to incorporate a gas leak detection system
  - All gas pipe work to be painted with primer, undercoat and yellow gloss finish.

Gas fired boiler and CHP plant incorporating primary heat distribution

- Performance objective

  Gas Fired Boilers and Combined Heat and Power (CHP) to generate the low temperature hot water (LTHW) for the heating system, domestic hot water and pool water heating requirements, with the CHP running as the lead heat source.

- System description

  The CHP and heating plant to be housed in the boiler plant room and to consist of gas fired CHP plant, gas boilers and associated pumping and pressurisation systems. The boiler plant to be more efficient than the current Part L2 building regulations specify. To achieve the required BREEAM rating, close attention to the target NOx emissions to be required.

  The system to consist of the following:

  - Gas fired CHP (incorporating anti-vibration mount and platform as well as inlet and outlet acoustic attenuation)
  - Thermal stores to optimise efficiently of the CHP
  - Gas fired boiler plant
  - Variable volume primary boiler and CHP pumps
  - Variable volume primary heating circuit (duty and standby)
  - Pressurisation system complete with expansion vessels, water make up tank, pumps and controls
  - Water treatment plant
  - Dirt/air separator
  - 2 no. plate heat exchanger interfaces, 1 between CHP and primary heating circuit and the other between primary heating circuit and pool water heating plant
  - Secondary heating pumps all ancillary circuits (DHWS, air handling units)
  - All primary and secondary distribution circuits
  - LTHW pipe work and associated accessories
  - Natural gas pipe work and associated accessories from statutory authority supply point
  - All LTHW pipe work to be insulated and cladded in the Boiler and CHP plant room
  - Gas boiler flues to be terminated

approximately 3 m above the finished roof level
    - CHP flues to terminate a minimum of 3 m above the level of gas flue discharge (TBC by air quality calculations)
    - All pumps to be complete with anti-vibration mounts and acoustic shrouds
    - Insulation and cladding to be provided to all flues
    - Associated controls.

Low temperature hot water (LTHW) heating / local heating units

- Performance objective

  LTHW system to provide heating to the building.

- System description

  The system to consist of the following:

    - Secondary distribution circuits to serve domestic hot water systems (DHWS), heating and air handling unit heating coils
    - All heating pipe work to be distributed from the plant room to the spaces via risers, service trenches and ceiling voids
    - LTHW pipework and associated accessories
    - Final locations and quantity of take offs to be established during the detailed design
    - All LTHW pipework to be insulated
    - All associated controls
    - LTHW 80°C (Flow) 60°C (Return).

Heating

- The pool development to be provided with LTHW supplies from the Primary LTHW system to all air handling unit heating coils, DHWS calorifiers and all space heating requirements.

Control and monitoring

- Performance objectives

  A Building Management System (BMS) and control system to be installed.

- System description

  The BMS and control system to comprise of the following elements:

    - A BMS supervisor
    - Intelligent outstations and controllers to serve central plant and distributed equipment
    - Associated control and network wiring
    - Motor Control Centres (MCC's)
    - Power wiring from MCC's to associated equipment, such as fans, pumps etc
    - Sensors and control devices i.e. motorised valves
    - The BMS and control system to be designed to provide the required control and monitoring functions.

- Control strategy

  The following systems to be controlled and monitored by the BMS:

    - Boilers, CHP and the LTHW heating systems
    - Domestic hot water systems
    - Air handling units and fans
    - Ventilation
    - LTHW Warm air curtains for the reception and entrance areas
    - Natural gas supply and distribution.

  The following systems to be monitored only by the BMS:

    - Mains water supply and distribution
    - LV main circuit breakers
    - Leak Detection system.

Specialist pool services

Design criteria

The pool water treatment system to be designed to take account of the following:

- Swimming Pool Water Treatment and Quality Standards for Pools and Spas, Pool Water Treatment Advisory Group (PWTAG) 2009
- HSG 179, Managing Health and Safety in Swimming Pools, 2003
- PAS 39: 2003 Management of Public Swimming Pools – Water treatment systems, water treatment plant and heating and ventilation systems – Code of practice
- BS EN 13451-1:2001 Swimming pool equipment – Part 1: General safety requirements and test methods
- BS EN 13451-3:2001 Swimming pool equipment – Part 3: Additional specific safety requirements and test methods for equipment for water treatment purposes
- Health and Safety at Work Act 1974
- BS EN 15288-1:2008 Swimming pools - Safety requirements for design
- BS EN 15288-2:2008 Swimming pools - Safety requirements for operation.

Principles

To provide an appropriate quality of water in the pool, the treatment system must remove the pollutants introduced by the bathers. There are three generic water quality issues to consider:

- Physical, such as the water clarity
- Microbiological
- Chemical.

Bathers introduce suspended and colloidal matter into pool water. This reduces the water clarity and detracts from the appearance of the water. This matter is to be effectively removed by good quality filtration - traditionally this would be sand media vessels.

Micro-organisms, introduced into the pool by bathers, to be killed in order to render the water safe and to prevent cross-infection between bathers. There are several disinfectants and oxidising agents for pools that can disinfect and sometimes even sterilise the pool water. The most appropriate chemical for disinfection, and for the provision of a residual disinfectant in the pool water, is chlorine. Chlorine donors come in three forms: chlorine gas, sodium hypochlorite and calcium hypochlorite.

The chemistry of swimming pool water is a complex inter-relationship between the:

- Bather load
- Organic pollution from bathers
- Disinfecting agent used to kill the micro-organisms
- Use of additional treatment for enhanced water quality.

The organic pollution from the bathers reacts with the chlorine disinfecting agent to produce chloramines. These cause the typical pool hall smell and are known irritants. An objective of the treatment process is to minimise the production of chloramines so as not to affect the comfort of bathers, poolside personnel and spectators alike.

Where the organics concentration is high, then additional treatment is required either to breakdown the organics and prevent them reacting with the chlorine or to breakdown the chloramines themselves. Where the organics concentration is low, then additional treatment can be utilised to ensure an excellent water quality at all times.

The water treatment system to provide a water quality in accordance with the PWTAG guidelines. The pool water to be safe, hygienic, comfortable to swim in and aesthetically pleasing.

Key design criteria

The water treatment system to consist of selected pool water treatment elements to provide the primary level of treatment and additional treatment as necessary for enhanced water quality.

- Turnover period and bather load

  The turnover period for a swimming pool is the time taken for a volume of water equivalent to the effective pool water volume to pass through the water treatment system.

  The design turnover to be based upon the recommendations of the guidelines for the maximum bather load for each pool, the recommendations with PWTAG's guidance, and the clients preferred design criteria.

Pool Type	PWTAG Recommended Turnover Period
25 m Public pools (1 m deep shallow end)	2.5 – 3 hours

- Water removal

  The most contaminated water in the pool, the surface water on the pool surround, to be removed via deck level transfer channels located around the perimeter of the pool tank.

  The transfer channels to be hydraulically designed to minimise water turbulence and hence evaporative and chemical losses. The reduced turbulence also aids in reducing the noise level from the channels.

  Pool water to be drawn off at the deep end of the pool through the pool base. The outlet grilles to be flush fitted with their tiled surroundings.

- Water collection

  The pool to have a balance tank, connected to the transfer channels, that forms part of the pool tank structure. The tank to have adequate capacity for bather displacement, system hydraulic operation and backwashing of all of the system sand filters.

- Straining

  Pool water drawn from the balance tank and the pool base outlets to be strained before entering the circulating pump impeller. One strainer to be provided for each pump suction.

- Pumping

  Duty circulating pumps to be sized to provide the required system flow and typically in parallel pump operation. Spare/standby pumping capacity to be provided in the form of a non-duty pump. For each pump, speed to be controlled by its own dedicated variable speed drive inverter controller.

- Flocculation

  A chemical flocculant to be continuously dosed into the full flow circulating pipework, in accordance with PWTAG recommendations on dosing rate and pool water contact time pre filtration. The industry standard is poly-aluminium chloride (PAC) which is an aluminium based long chain polymer flocculant.

- Sand filtration

  Vertical mild steel filters to be provided, in a number and size to suit the system flow rate to ensure each filter bed filtration velocity to be in accordance with PWTAG recommendations. Filters to be internally lined and have frontal pipework, valves and underdrain systems appropriate for air scour and backwashing. Filters to be capable of being backwashed with prefiltered water. Filtration media to be single grade sand.

- Pool water heating

  Typical 25 m multifunction pool temperature is 29 to 30°C.

  Heating to be via a single plate heat exchanger. A booster pump to be used to circulate the pool water through the heat exchanger. Control of pool water temperature and primary heating supply to the heat exchangers to be by the M&E services via the BMS system.

- Chlorination

  The nature of the source water to be a key factor when determining the type of chlorine that can be used and each site to be assessed individually.

  Typically for:

  - hard water areas, the preferred chlorine donor to be sodium hypochlorite, an aqueous solution containing 14-15% weight for weight (w/w) available chlorine. Sodium hypochlorite to be delivered to site via a special chemical tanker, with the chemical being pumped into a bulk tank within a bunded area in a dedicated chemical store.
  - soft water areas, the preferred donor to be calcium hypochlorite, typically in pellet form containing 65% w/w available chlorine. Calcium hypochlorite to be delivered to site in sealed plastic carboys, with the chemical being manually handled into a dedicated chemical store.

- pH correction

  A pH correction chemical suitable for the chlorine donor and the source water in the area to be required to maintain the pH of the pool water between 7.0 and 7.6.

  Typically where the source water alkalinity is:

  Low, i.e. typically less than 100mg/l as calcium carbonate ($CaCO^3$), then carbon dioxide (CO^2) to be the preferred medium. CO^2 to be delivered by special bulk tanker, and stored in a specialist pressurised cylinder on site within a dedicated chemical store.

  High, i.e. typically greater than 150 mg/l as $CaCO^3$, then hydrochloric acid, an aqueous solution containing between 20 to 36% w/w hydrochloric acid, to be the preferred controller. This to be delivered to site in sealed plastic carboys that are stored in a bunded area within a dedicated chemical store.

- Water return to the pools

  Treated water to be returned to the pool via wall mounted inlets fitted flush with the wall tiling. The pool water distribution system to be dye tested to assess the efficacy of the input and distribution of treated water in the pool tank.

- Enhanced water treatment

  There are various additional treatments currently on the market that claim to be able to provide an enhanced quality to the water treated by sand filtration and chemical addition systems alone. Many of these treatments are not common within the UK swimming pool industry, are poorly documented and may be considered peripheral. However, two treatments that have been recognised as being able to deliver a substantial water quality enhancement are ultraviolet irradiation (UV) or ozone gas (O^3). Both of these treatments will result in lower chloramine levels in the pool water, will provide a better water quality and a better air quality within the pool hall with lower odour. Lower chlorine residuals can also be maintained.

  The most effective of the two systems is O^3 but it is more expensive to install and maintain than UV, is more difficult to operate and requires a considerable amount of additional plantroom space. A UV system, although not as effective, is more compact, easier and cheaper to both operate and maintain and is very reliable. UV treatment is to be included on the Community Pool scheme to provide secondary disinfection and water quality enhancement.

Requirements	4 lane	5 lane	6 lane	8 lane	Secondary pool (6 lane)	Secondary pool (8 lane)
Water area, m^2	212.5	262.5	312.5	425	91	119
Usable volume, m^3	296	366	436	592	65	89
Temperature, °C	Typically 29 - 30					
Bather load [16]	69	86	102	138	41	54
Treatment plant flow, m^3 / hr	118	147	174	235	70	94
Turnover, hours	2.5	2.5	2.5	2.5	0.93	0.94
Filters, no. / diameter (m)	2 x 1.8	2 x 2.0	2 x 2.2	2 x 2.6	2 x 1.4	2 x 1.6
Filtration rate, m / hr	23.2	23.4	22.9	22.1	22.7	23.4
Enhanced treatment	Full flow UV					
Flocculant	PAC					
Chlorine donor	To suit local source water characteristics					
pH control	To suit local source water characteristics					
Free chlorine, mg / l	Typically 0.5 – 1.0					
pH	7.0 – 7.6					
Langelier Index	0 – 0.5					
Heat load, kW (Estimated maximum)	186	230	275	300	54	70
Electrical load, A (Estimated maximum)	52	58	65	72	37	40
Backwash drainage load, litres / s	21.2	26.2	31.7	44.2	12.8	16.8

Indicative PWTAG 2009 calculations for fixed pool profiles (as shown on page 34)

[16] Number will vary with pool depth.

Schedule of equipment and materials

Strainers	Manufactured in stainless steel grade 316, with mesh size of 3 mm.
Pumps	Close coupled end suction centrifugal type to ISO 2858. Pump motors to operate at less than 1500 r.p.m. on 3pH, 415V, 50 Hz supply.
Pipework	uPVC Class C to BS 3505. Joints and fittings solvent cement welded/ flanged to BS 4396/1. Air line pipework to be in ABS to DIN 8062. Pipework supports to be in Unistrut or similar.
Valves	Butterfly type, short pattern to BS 5155, on all main flow lines; non return valves of wafer type with valve flap. Manual valve actuation on valves over 200 mm to be gear operated.
Filters	Mild steel, vertical type pressure vessel, welded construction to BS 5500 generally. Filter shell to have an internal protective coating with a five year guarantee. Filtering media typically single grade, 16/30 sand. Complete range of filter accessories to include manhole, sandhole, automatic/manual air release, pressure gauges etc. RMF option could be considered on a scheme by scheme basis.
Air Blower	For air scour, low pressure packaged air compressor, to supply oil free air.
Heat Exchanger	Gasket construction, stainless steel plate heat exchanger, with plates mounted in frames.
Flow Meter	Non-invasive flow meter, mounted before the sand filters to measure plant and backwash flows.
Pressure Gauges	Bourdon type pressure gauges.
Chemicals	Automatic dosing and control for chlorine donor and for pH control
Pool Fittings	White Darvic or white uPVC or similar.
Ultraviolet	Full flow, stainless steel chamber, UV dose at 60 mWs/cm^2, medium pressure discharge lamps.

Water treatment system interfaces

There are many areas where the water treatment systems interface with other elements of the building. These to be detailed, scheduled and agreed with the appointed architect, structural engineer and M&E engineers and to include for drainage and builders work elements.

Plant room and chemical stores

All of the water treatment equipment to be housed in the basement plantroom. The plant to be arranged for maximum hydraulic efficiency, ease of operation and ease of maintenance. To facilitate the removal of major plant items such as the sand filters, a removable floor section and demountable louvres to be provided.

Two independent dedicated chemical stores are to be provided. One for the storage of acids i.e. hydrochloric acid and bulk storage of CO^2 etc. and one for the storage of the chlorine donor (an alkali) i.e. sodium and calcium hypochlorite. The chemical storage areas to be bunded to provide a leakage catchment capacity for the liquids of at least 110% of the maximum amount of chemical to be stored in a particular bund area. A storage facility of approximately one month's supply of chemicals to be allowed for in the chemical stores.

There are certain key safety criteria to be applied with regard to the design of the chemical storage areas. These include:

- Separate secure chemical storage rooms for acids and alkalis
- Chemical stores at grade, accessed only from the outside
- Bunded areas for all chemicals
- Appropriate internal and external signage
- Appropriate ventilation of the chemical stores
- Controlled access to each of the chemical stores
- Adequate delivery access to the chemical stores
- Emergency wash down facilities in each of the chemical stores.

Electrical services

LV distribution

- Performance objectives

  To provide a system of low voltage distribution within the areas comprising main switchgear, sub-main switchgear and local distribution boards.

- Standard supplies

  Main LV Distribution

  - The main LV switchboard to comprise of a single section switchboard. The switchboard to comprise MCCB incomers with MCCBs for outgoing services. Automatic power factor correction to be provided to the main switchboard.

  Sub-main Distribution

  - The sub-main distribution to take the form of XLPE/SWA/LSF multi core cables run from the main switchboard, to distribution boards positioned in the plantrooms and electrical cupboards. From these on-floor switchboards XLPE/SWA/LSF multi core cables to be run to local distribution boards. Where an area and facility requires supplies of differing levels of integrity separate distribution boards to be provided for each level of supply.
  - The distribution boards to be of the wall mounted type with MCCBs or MCB's providing protection to the outgoing circuits.
  - The local distribution boards to be either type "A" or "B" single or three phase as required, generally having type 'B' and 'C' MCB's providing protection to the outgoing circuits.

Telecommunications

A total of two cable ducts have been allowed for the development, one for BT and one for cable companies.

Each of the ducts to run to the data / comms position within the plantroom for the future installation of telecommunications cabling. The ducts to conform to the specific requirements of the telecommunications companies with regards to layout, construction and installation.

From this position each basket tray to be installed within the services routes for wiring by the fit out contractor. Draw points to be provided where necessary for the installation of the telecommunication services.

Fire alarms and smoke detection unit systems

An addressable analogue AFD system to be provided in the building to L2 standard in conformity with BS 5839 Part 1, fully integrated with the manual fire alarm facilities. This to cover horizontal and vertical escape routes and any identified areas of enhanced fire risk.

The system to include detector devices, break glass call points, and sounders, on all escape route and vulnerable spaces, smoke detection to be included within all voids/ ceiling voids with a greater height than 0.8 m.

Any detectors in the plant or reception areas to cause an evacuation signal to sound in all of these areas.

Call points to be sited at final exits and other locations such that no one has to travel more than 30m to a call point.

The system to be a two stage alarm where on operation of a device to alert the reception area first, if the device has not been reset within 5 mins or an additional device is activated, then full evacuation to be instigated.

Fire Alarm Control Panel

A fully addressable multi loop automatic fire alarm control panel to be installed, at reception on the ground floor, to provide the following:

- Main control and indication equipment
- Integral power supply
- Smoke sensors/Heat sensors connections
- Break glass units/call points connections
- Alarm bells/sounders and Xenon beacons in disabled toilets and plantrooms
- Interface units - as described below
- Control devices - as described below.

Where the swimming pool is attached to an existing facility then the fire alarm detection system to be interfaced with the development's central system.

Interfaces with the fire alarm system

The following interfaces to be provided with the fire alarm and detection system:

- Plant interface units - to allow plant to operate in accordance with the requirements of Building Control and the Fire Officer during a fire alarm.
- Hardwired interface with the fireman's control panel – to switch mechanical ventilation systems as required by the fire officer.

The fire alarm system to be configured such that no mechanical plant or gas supplies to be affected by any normal fire alarm testing or commission operations.

The system to be configured such that on evacuation of the building under fire conditions the gas solenoid valves and all mechanical plant to be shut down.

Television & radio distribution

Television and radio services not to be provided for the community pool.

Lighting

- Performance Objectives

  Provide general lighting to the general environment and working plane considering energy efficiency, maintenance, colour appearance, rendition, and glare control.

System Description – General Areas	
Luminaires	To be controlled via a central lighting control system
General lighting	Normal operation
Half lighting & maintenance lighting	To enable reduced illumination to specific areas when unoccupied, conserving energy
Security lighting	To facilitate security patrols within the space
All areas	To be covered with ambient lighting with integral emergency units and small power for cleaning.

Light fittings not to be mounted above the pool to facilitate maintenance.

Light fittings to be directed so as to avoid glare or reflection to bathers and staff. The use of uplighters is preferred as opposed to using direct lighting.

Main Pool	
Illumination level	300 lux
Uniformity	0.8
Lamp type	1x400W HQI-T metal halide
Lamp colour temp	4200°K
Fitment type	Bracket mount
Control gear	Integral
Ip rating	IP65
Finish / colour	White GRP moulding with integral gear and toughened glass
Areas fitting used in	Swimming pools

The luminaires to be low wattage high efficient light sources taking into consideration colour rendering, lamp life and energy efficiency.

All luminaires to be selected in conjunction with the Architect, they must be suitably treated for aggressive environments as well as IP55 rated as a minimum.

Changing Areas	
Illumination level	150 lux
Uniformity	0.8
Lamp type	4 x 14W T5 linear fluorecent
Lamp colour temp	3500°K
Fitment type	Reccessed
Control gear	High frequency
Ip rating	n/a
Finish / colour	Welded steel box (600x600mm) finished powder coated white with prismatic difuser.
Areas fitting used in	Changing, toilets

Example of pool with wall mounted luminaires

Reception area / Office	
Illumination level	250 lux / 400 lux
Uniformity	0.8
Lamp type	1 x 70W HIT metal halide
Lamp colour temp	3500°K
Fitment type	Reccessed
Control gear	Electronic control gear
Ip rating	IP44
Finish / colour	Smooth textured, with white die cast aluminium bezel
Areas fitting used in	Reception area / office

Plant rooms	
Illumination level	150 lux
Uniformity	0.8
Lamp type	1 x 54W T5 linear fluorecent
Lamp colour temp	3500°K
Fitment type	Surface / suspended
Control gear	High frequency, electronic
Ip rating	IP54
Finish / colour	Cast GRP body with acrilic diffuser
Areas fitting used in	Store rooms, plant rooms

Emergency lighting

- Performance objectives

  Provide emergency lighting to escape routes and open areas. Locate emergency exit signs to define clear and unambiguous escape routes.

- System description

  Luminaires that are normally operational are utilised to provide the emergency lighting.

  Generally emergency lighting to be provided by integral self contained emergency packs within normal luminaires. This system to provide 3-hour backup for all the emergency luminaires.

  Pool hall lighting to consist of self contained flood packs to IP65, positioned around the perimeter of the pool.

External lighting

- Lighting to any external walkways to be provided to allow egress and access to the space with emergency fittings installed as required by Building Control and Approved Inspector Services to the requirements of BSEN 5266-1 2005.

- Photocell operated contactor controlled final circuits from the external lighting to control the external lighting. Photocells to be provided for each of the elevations and to control those luminaires at that orientation.

- The building's feature lighting circuits to be controlled by a time clock. The Contractor to ensure that the operation, positioning of luminaires and the hours of operation do not contravene any local authority byelaws or regulations. Exact hours of operation to be confirmed with the Client.

- 2No lighting points to be provided for the provision of back lit signs to the centre.

General power

- Performance objectives

  The general LV power distribution to include all the sub circuit installations from the LV distribution boards to final outlets, fused connection units and other outlet accessories.

- System description

  The general LV distribution to include all the installations from the LV distribution boards to the final outlets or fixed equipment.

  Socket outlet circuits to generally be wired in standard ring circuits. Items of fixed equipment to generally be wired in standard radial circuits. All general purpose and cleaners circuits will incorporate RCD protection within the distribution boards.

  Socket outlets for cleaning purposes to be positioned so that a 10 m trailing lead can cover all areas excluding the pool hall and changing room areas which are deemed as wet areas.

  All accessories to be of a common type, complete with cover plates of the same manufacturer and have the same finish and details.

  Unless stated otherwise, accessories to be generally flush mounted except in plant areas where they will be surface mounted.

All items of fixed equipment to be provided with suitable means of isolation. This to be located within reach of the equipment served and be accessible at all times.

Unless specifically stated all final circuits to be wired in single core cables with LSF insulation contained within conduit and trunking. Each final circuit to have a separate circuit protective conductor.

Voice and data services

- Performance objectives

  To provide a cabling system for the distribution of voice and data services to all parts of the facility. To provide containment systems for the telecommunication's system cables and the data cables.

- System description

  Voice and data and RF services

  A structured wiring system to be provided comprising of main trunk wiring from the central voice and data system to distributed communication racks located within the office. The points fed to consist of:-

  - Reception desk
  - Book office
  - Poolside
  - Plantroom
  - BMS
  - Security panel
  - Fire alarm panel

  The main trunk cables to comprise copper multi pair cables, co-axial cables, fibre-optic cables etc as required for each system served. The local run-out cables to generally take the form of Cat 5e type data cables, configured to meet the Client's system performance specification.

  All cables to be run within risers and false ceilings on cable trays sized to carry the required number of cables with 10% spare capacity for future.

  The run-out of all cables to be within a maximum route length of 90 m.

CCTV system

The CCTV system to include a number of fixed interior colour cameras, providing images of the main reception area and the main reception area entrance doors. The internal cameras to be fixed colour domes, with a minimum of 540TVL, lens sizes to be calculated at installation. Cameras to be 24v and housed in smoked domes.

The external cameras to be fixed ¼"day and night mini fixed domes, in weatherproof and vandal resistant housings. The external cameras to be situated to cover external entrances and exits and vulnerable areas, such as windows, doors and the car park area.

A colour 17" LCD monitor to be supplied for the reception desk, as well as colour 21" LCD monitor for security personnel located adjacent to the hard drive recorder.

The recorder hard drive to be sized to allow 12-14 hours continuous recording, with recording outside of this time triggered by movement detection. The recorder hard drive to allow recording on this basis to be stored for 30 days. The hard drive recorder to have the facility to export images to a portable USB device or CD\DVD. The hard drive recorder to be networkable allowing access to both stored and live images from authorised locations on the network. All necessary software to be free issued at time of commissioning for installation onto authorised computers by others.

Intruder alarm system

The intruder alarm system for the development to be grade 2.

The intruder alarm control panel to be located in the front office, with a remote keypad installed adjacent to the main reception entrance and at one other location to be confirmed.

The system to monitor the entire centre using a combination of door contacts and passive dual technology movement detectors to provide an indication on the intruder alarm control panel of a possible intruder event.

Panic alarm push buttons to be located at the reception desk.

Fire exit doors to be monitored 24 hours a day and cause an alarm to sound at the main control panel or other suitable (manned) location through Internal sounders to also be located in strategic positions to alert staff to any intruder event.

Any alarm generated when the system is set to cause all CCTV cameras to switch to record in real time.

The system to be capable of generating a confirmed alarm and to be programmed for key holder response only by a connection to a central monitoring station via a dual comms plus BT landline and GSM radio connection. External sounder and strobes to be located on two sides of the building.

Accessible alarms

Each designated accessible toilet to be provided with an independent alarm system.

All accessible alarms to be remotely monitored at the reception area.

The system to comprise a power supply unit located in the ceiling void, an overdoor lamp, a tone generator coil and ceiling pull cord switch with reassurance light mounted high level internal to the toilet.

At the reception area desk a wall mounted multi-way indicator with integral sounder to be mounted to provide an alarm facility.

Poolside alarms

Each lifeguard position to be provided with an independent alarm system.

All alarms to be remotely monitored at the reception area.

The system to comprise a power supply unit, a lamp and tone generator coil.

At the reception desk, a wall mounted multi-way indicator with integral sounder to be mounted to provide alarm facility.

Earthing and bonding

- Performance objectives

  To provide sufficiently low resistance paths to ensure transfer of electrical current under fault conditions arising within the supply and distribution systems, thereby protecting personnel, the building and equipment therein.

  To dissipate earth leakage from equipment under normal operations.

- System description

  General

  - The earthing and bonding to consist of LV system earthing, CHP generator earthing, equipotential bonding to incoming services, supplementary bonding to the requirements of BS 7671, lightning protection system bonding and clean earth distribution to data rooms.
  - The electrical system to follow the TN-S system of earthing, i.e., having separate neutral and earthing conductors throughout.
  - Earth disconnection test points to be provided at main earth bars within the LV Switch rooms.
  - All earth cables to be green and yellow LSF covered copper cables, except the functional earth cables to have a cream coloured LSF outer sheath.

  LV system earthing

  - Sub main cables to utilise the steel wire armouring as a circuit protective conductor, with supplementary earth cables run where deemed necessary. Each final circuit wired in single core cable to include a separate circuit protective conductor.

  Equipotential bonding

  - Main equipotential bonding to ensure that all extraneous conductive parts are bonded to the main earth bar. This to consist of bonds to the main water pipes, main gas pipes, ductwork, pipework, exposed metallic parts of the building structure, thermal insulation metallic cladding, metallic cable sheaths of all cables (except British Telecom) and the lightning protection systems.

  Supplementary bonding

  - Supplementary equipotential bonds to be made to interconnect all simultaneous accessible conductive parts to the protective conductor system. This to generally be undertaken in shower rooms, boiler rooms, calorifier rooms, all other plantrooms, wet and damp process areas and kitchens.

  Clean earth

  - An insulated clean earth bar to be provided in the data rooms at each floor level. Each earth bar to be wired directly back to the main earth bar within the main switch room.
  - Telecommunications and technical systems functional earth.
  - Functional earth systems to be installed from the main earth bar to the main Telecoms rack to meet the requirements of the systems.

Lightning protection

A fully enclosing lightning protection system to be provided to protect the new development utilising the building structure where possible eg. copper lightning tape fixed to steelwork. The complete installation to include bonding of all new roof projections as required to meet the requirements of BS 6651: 1999.

Appendix 6
Technical Data

Internal areas

Internal spaces (excluding partition walls and structure)	4 lane (m^2)	5 lane (m^2)	6 lane (m^2)	6 lane + secondary pool (m^2)	8 lane (m^2)	8 lane + secondary pool (m^2)
Entrance lobby / reception [17]	101	108	128	131	147	158
Office [17]	21	26	27	32	26	27
Informal viewing / spectator seating	8	75	75	75	79	115
Pool and surround	426	487	550	782	714	958
Changing cubicles	25	28	35	38	42	49
Baby change / unisex accessible changing	23	24	24	24	25	25
Accessible / family / group changing	23	24	30	25	75	75
Showers (incl. accessible showers)	12	18	20	22	28	32
Circulation / wheelchair / lockers / vanity	125	130	139	154	178	174
Female / male wc	30	32	38	41	38	41
Unisex accessible wc	6	6	6	12	12	12
First aid	10	14	14	14	14	14
Pool store	22	28	42	43	72	80
Other stores	5	7	7	7	8	8
Net accommodation	**837**	**1,007**	**1,135**	**1,400**	**1,458**	**1,768**
Ground floor plant	72	102	137	137	140	158
Lower level plant [18]	89	112	115	163	-	-
Upper level plant	60	87	105	120	250	255
Net plant accommodation	**221**	**301**	**357**	**420**	**390**	**413**
Gross Internal Floor Area (GIFA)	**1,084**	**1,344**	**1,529**	**1,850**	**1,878**	**2,226**

Notes:

- The internal floor areas should be read with the Capital Cost Overview on page 15
- Areas are not to be relied on for any purpose other than the formulation of the cost plan
- Balance tank areas are excluded from the schedule
- Areas are measured from the indicative floor plans and round up to the nearest square metre
- An allowance for structure and internal partitioning is included in the Gross Internal Floor Areas.

Ratios or water area to main building elements

Description	Building GIFA	Pool and surround	Changing and toilets	Plant room
Ratios of average water area to building elements	1 : 4.59	1 : 1.81	1 : 0.89	1 : 0.97

17 Smaller areas may be possible by linking to an existing facility.

18 For 8 lane pool and 8 lane + secondary pool, area for pumps at pool base level is included in the ground floor plant area.

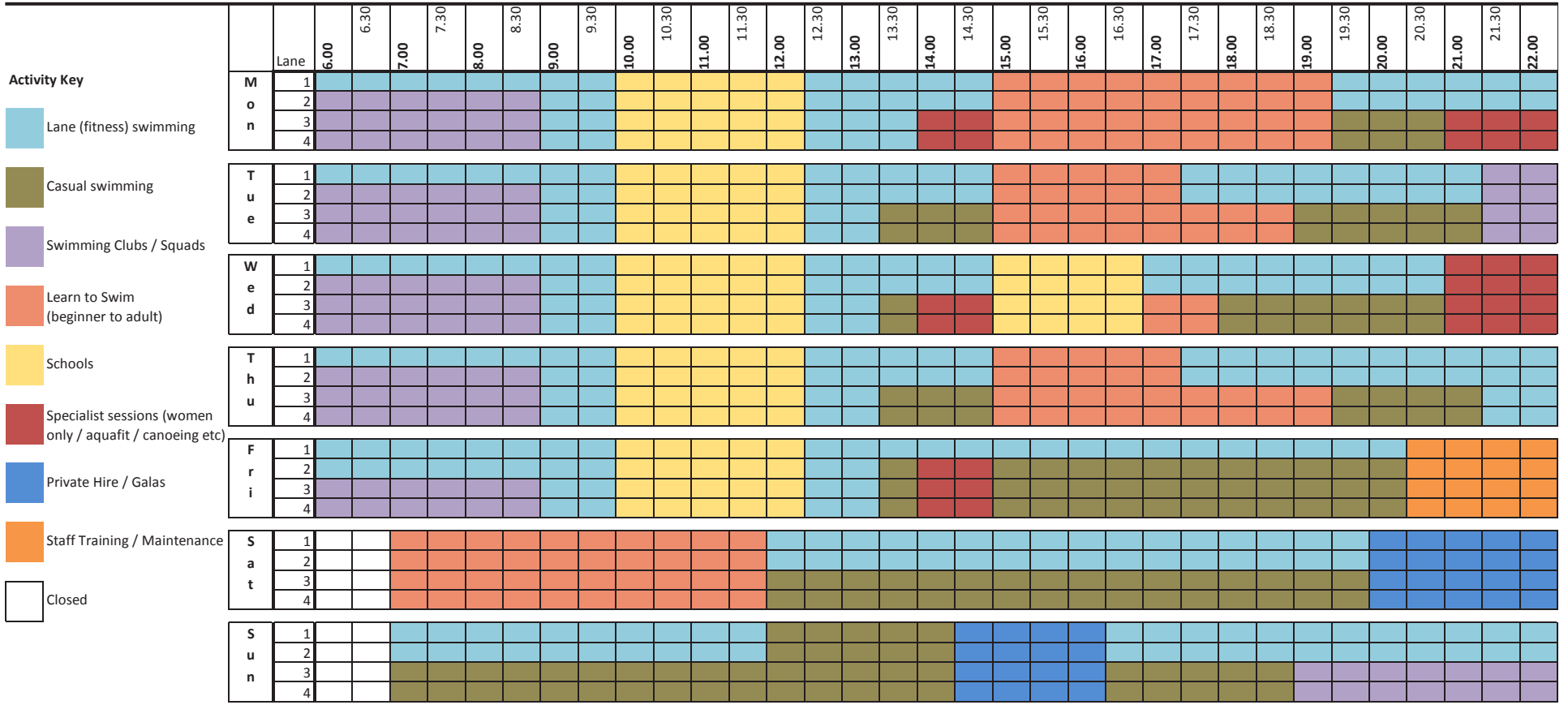
Changing room capacities

Water areas	4 lane (m^2)	5 lane (m^2)	6 lane (m^2)	6 lane + secondary pool (m^2)	8 lane (m^2)	8 lane + secondary pool (m^2)
4 lane 25 x 8.5 m	212.5					
5 lane 25 x 10.5 m		262.5				
6 lane 25 x 12.5 m			312.5			
6 lane 25 x 12.5 m + secondary 13 x 7 m				403.5		
8 lane 25 x 17 m					425	
8 lane 25 x 17 m + secondary 17 x 7 m						544
Occupancy of pool water	(no.)	(no.)	(no.)	(no.)	(no.)	(no.)
Maximum any one time capacity of water area for unprogrammed swimming = water area / $3m^2$ (HSG 179)	71	88	104	135	142	181
Maximum bathing Load (PWTAG 2009 - see page 65)	69	86	102	143	138	192
Estimated maximum occupancy / hour from the operating model (see page 18)	61	65	69	82	76	100
Average occupancy / hour from operating model (see page 18)	24	26	28	33	30	40
Changing spaces						
Changing spaces for sessional swimming assuming maximum capacity of pool (SE DGN Appendix 3)	24	30	35	46	48	61
Actual changing spaces provided (double cubicles)	28	32	40	44	48	56
Combined family / wheelchair / group rooms	20	20	24	20	16	16
Additional spaces in group changing rooms	-	-	-	-	60	60
Four Person Family Disabled (included above)	√	√	√	√	√	√
Unisex accessible changing room	1	1	1	1	1	1
Unisex Changing Places Facility (4.0 x 3.0 m)	1	1	1	1	1	1
Unisex Changing Room WC (2.5 x 2.4 m)	1	1	1	1	1	1
Total Lockers	85	105	125	162	170	217
Sanitary provision (BS 6465-1:2006)						
Male WC's	2	2	2	2	2	2
Urinals	2	3	3	3	2	2
WHB's	3	3	3	4	4	5
Showers	4	5	6	7	8	10
Vanity Places	3	4	3	3	4	4
Ambulent Accessible WC (incl. above)	√	√	√	√	√	√
Wider Ambulent Accessible WC (incl. above)	√	√	√	√	√	√
Female WC's	4	5	6	6	6	6
WHB	3	4	4	4	4	4
Showers	6	7	8	10	11	13
Vanity Places	2	3	3	4	4	5
Ambulent Accessible WC (incl. above)	√	√	√	√	√	√
Wider Ambulent Accessible WC (incl. above)	√	√	√	√	√	√
Cleaner's store	√	√	√	√	√	√
Baby change	1	1	1	1	1	1

Appendix 7
Programmes of use for 4, 5 and 8 lane pools

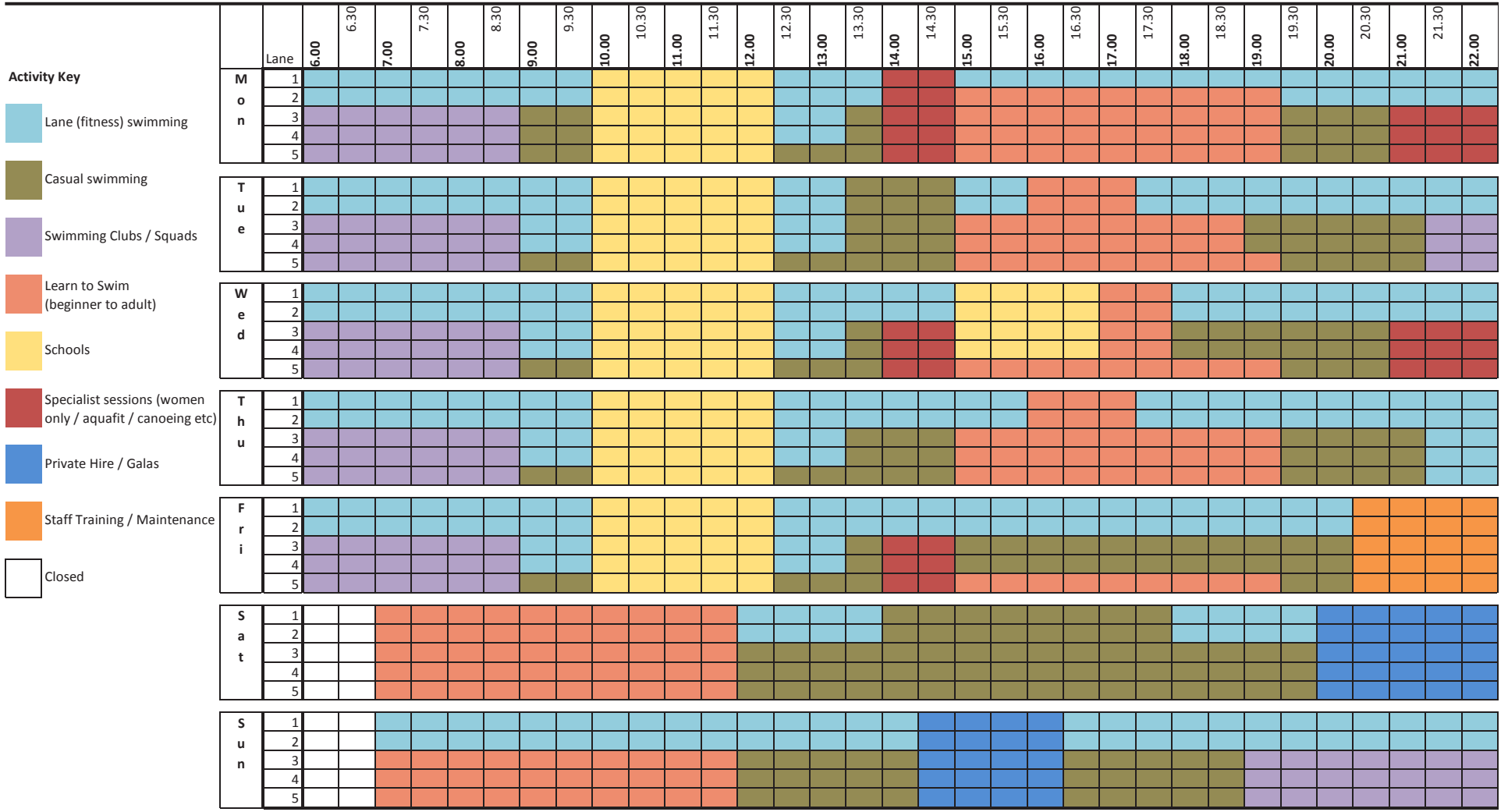
Indicative programme of use (4 lane pool)

Main pool - term time (39 weeks)



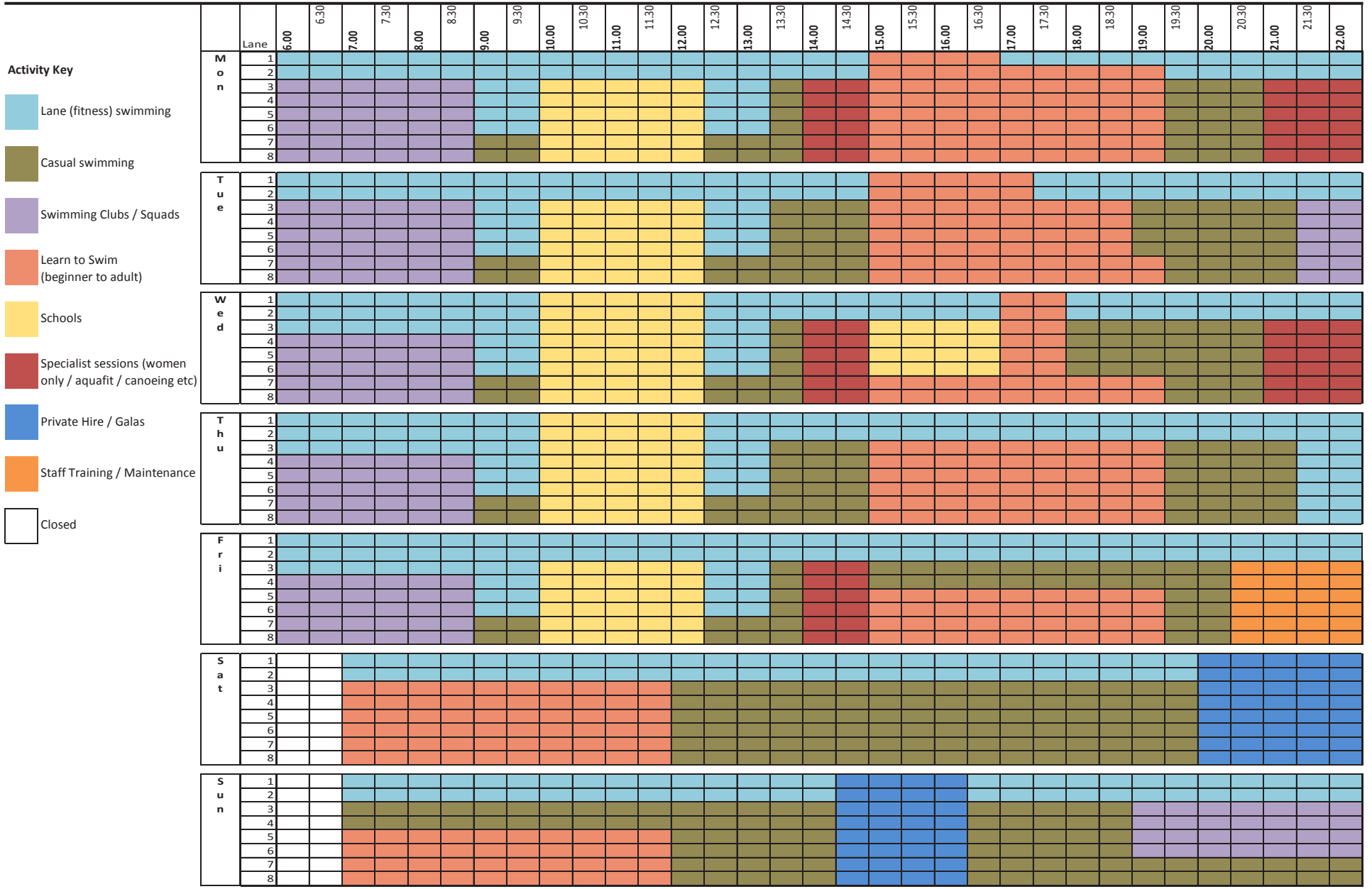
Indicative programme of use (5 lane pool)

Main pool - term time (39 weeks)



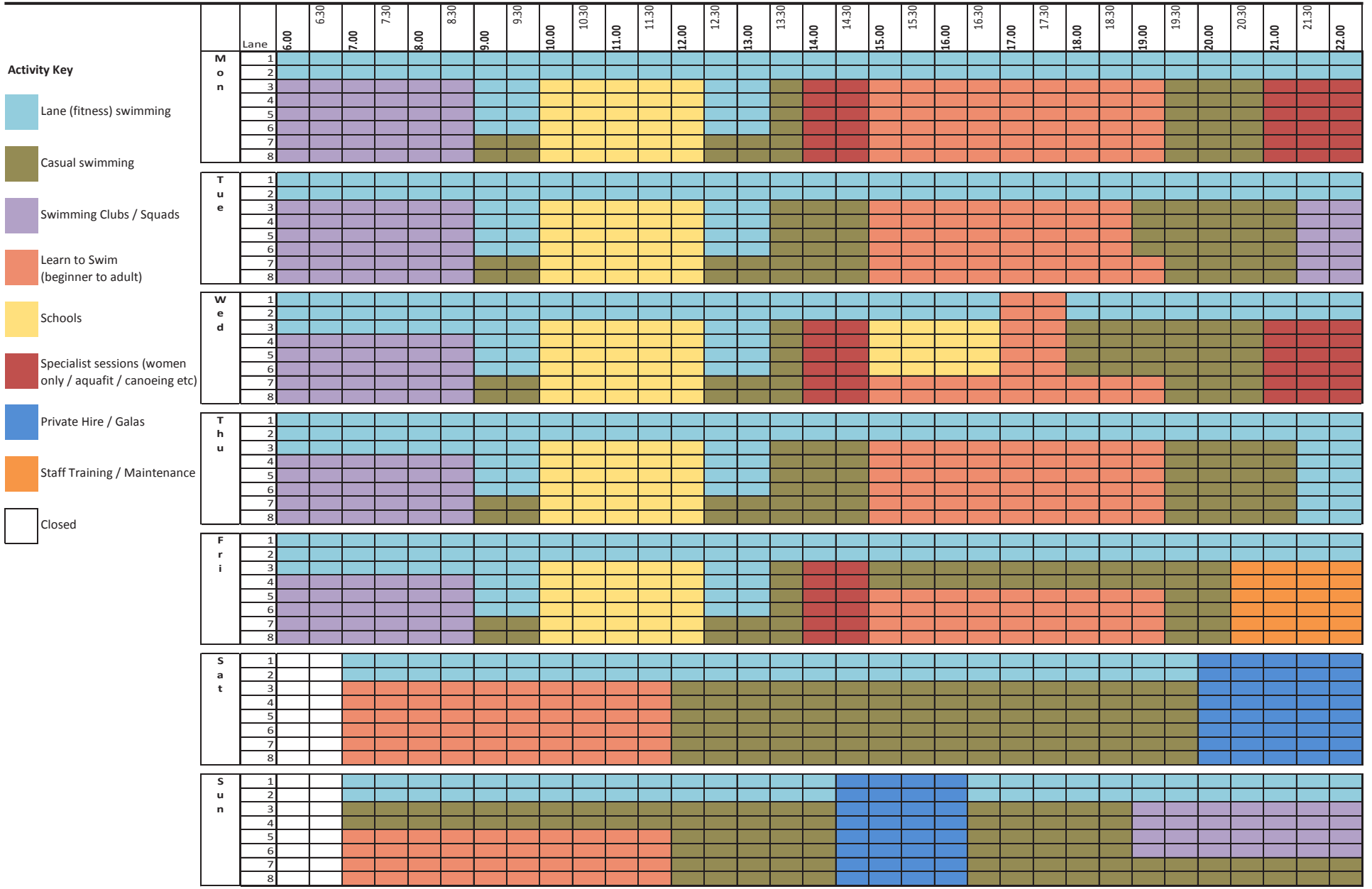
Indicative programme of use (8 lane pool) - graduated depth, no 'secondary' pool

Main pool - term time (39 weeks)



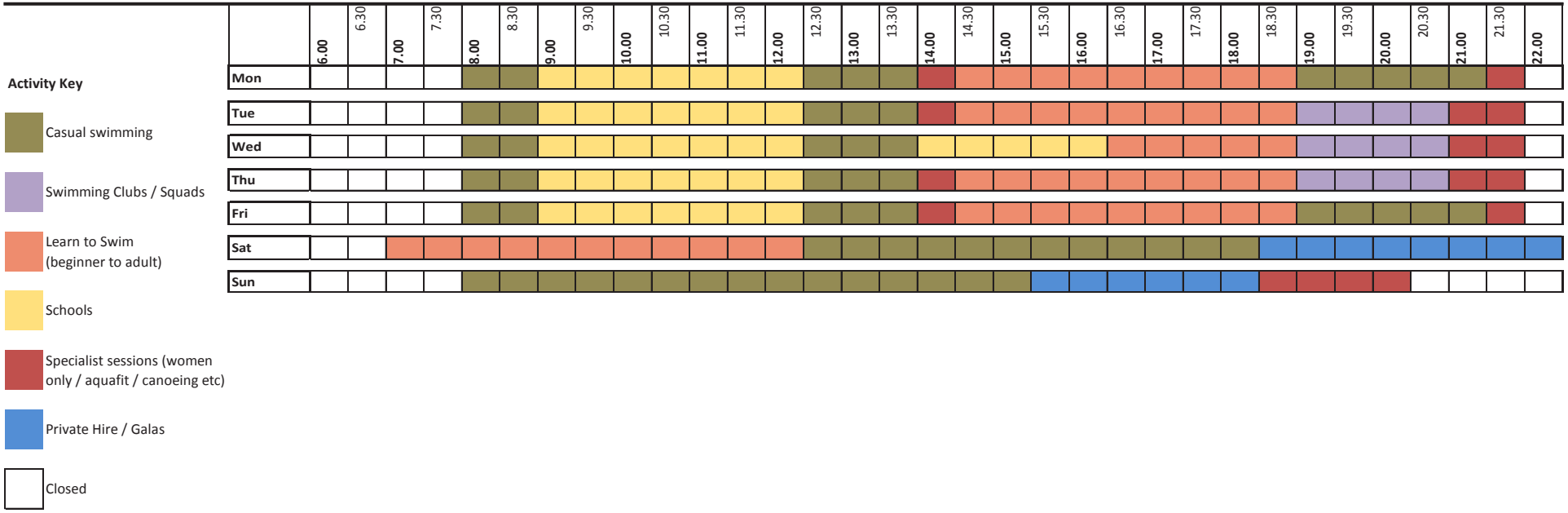
Indicative programme of use (8 lane pool with secondary pool) - constant depth with movable floor

Main pool - term time (39 weeks)



Indicative programme of use (secondary pool for 8 lane)

Main pool - term time (39 weeks)



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User Guide:

Before using this guidance for any specific projects all users should refer to the User Guide to understand when and how to use the guidance as well as understanding the limitations of use.

Click here for **'User Guide'**

Click here for current **'Design and Cost Guidance'**

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