Planning & Building Unit

Technical Guidance Document TGD - 030

Amendments to the M&E Building Services Guidelines (2004) TGD - 002 & ICT Infrastructure Guidelines TGD - 004 for Primary Schools.

(1st Edition, September 2012)

(THIS DOCUMENT SHALL BE READ IN CONJUNCTION WITH TGD-002, 004, 006, 021.2 & 026)

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PLANNING AND BUILDING UNIT

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1. INTRODUCTION:

The Department of Education & Skills (DoES) has an ongoing policy of updating its Technical Guidance documents for Mechanical & Electrical (M&E) Building Services & Information, Communication Technology (ICT) installations in primary schools.

DoES Technical Guidance Document TGD - 030 is an interim document and its provisions will be subsumed into DoES Technical Guidance Document TGD - 002, 004 & 006 when these documents themselves are next updated and posted on the DoES website www.education.ie . This document should be read in conjunction with DoES TGD - 002, 004, 006, 021.2 & 026.

It is to be used by school authorities and Design Teams to assist them in the design of the ICT installations and M&E building services on new school and extension projects in primary schools and also on refurbishment and upgrade projects where practical, appropriate and effective.

Once these guidelines have been posted on the DoES website they must be implemented in full on all new primary school projects entering the design process.

For projects currently in the design process it shall be implemented as follows:

- **PROJECTS WHERE STAGE 1 IS IN PREPARATION:**

  These guidelines shall be implemented and addressed in the design development of Stage 2a.

- **PROJECTS WHERE STAGE 2A IS IN PREPARATION:**

  Where time allows and the implementation of these guidelines is not likely to contribute to delays in the preparation of a Stage 2a submission they should be incorporated into the stage submission.

  Otherwise a Stage 2a submission based on DoES TGD - 002, 004 & 006 shall be submitted. These guidelines shall be implemented and addressed in the design development of Stage 2b.

- **PROJECTS PRE-STAGE 2B IS IN PREPARATION:**

  Where time allows and the implementation of these guidelines is not likely to contribute to delays in the preparation of a Stage 2b submission they should be incorporated into the stage submission.

  Otherwise a Stage 2b submission based on DoES TGD - 002, 004 & 006 shall be submitted. These guidelines shall be implemented and addressed in the development of Stage 3.

- **PROJECTS AT PRE-STAGE 3:**

The project should proceed without any amendments to tender documentation. Some or all of DoES TGD - 030 may be incorporated as post contract Change Orders.

- **PROJECTS WHERE TENDERS HAVE BEEN AWARDED:**

  Once the contract is signed some or all of DoES TGD - 030 may be incorporated at post contract stage.

DoES TGD - 030 is an outline schedule of the works required and will be revoked once the DoES TGD - 002 & 004 have been updated and posted on the DoES websites.

- www.education.ie
- www.energyineducation.ie

Standards and Acts quoted are current at the time of writing: the prevailing versions of these shall be used at the time of design and installation

2. TEACHING SPACES:

For the purposes of this document a teaching space is any room where formal teaching takes place. In Primary schools these include classrooms, special education tuition rooms, multi purpose room, library, learning support rooms and the general purpose room. Examples of rooms that are not considered teaching spaces are offices, staff room, stores.

3. DAYLIGHT DISTRIBUTION:

Good quality daylight distribution is required in each teaching space, office etc with the average daylight factor for each room to be a minimum of 4.5% with the emphasis on an even light distribution through the space.

In other occupied areas such as the Staff Room, Administration Office etc an average daylight factor of 4.5% while desirable is not critical if not achievable. These areas shall have reasonable daylight levels.

In considering windowsill heights in teaching spaces two key issues to be taken into account are (a) that wall space is at a premium and (b) the optimum location for radiators for efficient draught free operation is the area under the windows. Bearing these in mind and the need to avail of standard commercial radiators sizes, the windowsill heights in the radiator zone shall be a minimum of 700mm above the finished floor level. If the full window zone is not taken up by radiators it may be possible to lower the windowsill height in the part of the window zone that has no radiators. This zone should not have glazing below skirting height and should not have opening sections below 700mm.

Elsewhere they shall be as outlined in TGD - 002.

Computer calculations must be used during the design process for day lighting to ensure compliance.

A schedule of all rooms and associated daylight factor is to be provided as part of the Stage 2A submission.

In calculating the above daylight factor in a classroom the computer areas and the area 700mm in front of the storage wall, if provided, may be excluded.

If rooms must be north facing due to site restrictions efforts should be made to achieve solar penetration to the rooms.

4. NATURAL VENTILATION & OVERHEATING:

From a natural ventilation point of view all spaces other than storerooms, toilet areas and corridors etc in primary schools shall be deemed teaching spaces.

Good quality ventilation is critical to the functioning of a teaching space. When not adequately provided it results in a teaching space that is stuffy, overheating and not fit for purpose. Inadequate provision of natural ventilation cannot easily be rectified after a project is completed.

Inadequate ventilation problems that materialise when the finished building is occupied will be a matter for the Design Team to address in full with the school.

It is the joint responsibility of the Architect and Building Services Consulting Engineer as members of the Design Team to ensure that the window design meets the requirements of the room function.

Ventilation where possible should be natural ventilation by means of permanent wall vents and windows with opening sections. In determining the way in which a room is ventilated the Design Team should also consider acoustic factors, maintenance factors and running costs. The background ventilation area provided through permanent vents (whether in walls or windows) should exceed the current guidance set out in the Building Regulations.

For the purpose of calculating compliance with the Building Regulations with respect to purge ventilation the calculation shall be based on the relevant Building Regulations Technical Guidance Document.

The final window design should ensure that a minimum ventilation rate of 8 litres per second per pupil is provided in the space. This rate will probably need to be higher to achieve the objectives outlined above and to prevent overheating in the space. The resultant dry bulb temperature shall not exceed 25^{o}C for more than 5% of the school year in all habitable rooms and teaching spaces. As detailed in TGD - 022 the school year consists of 183 full teaching days; a full school day comprises a period of not less than five hours and forty minutes: tis equates to 1037 hours per annum. Therefore based on the 5% criteria the maximum that ah individual room should excess 25°C per annum for the academic year is 51.85 hours.

The Design Team shall also include a copy of the calculations for working out the 5% of annual hours and any other assumptions as part of a Stage 2a submission.

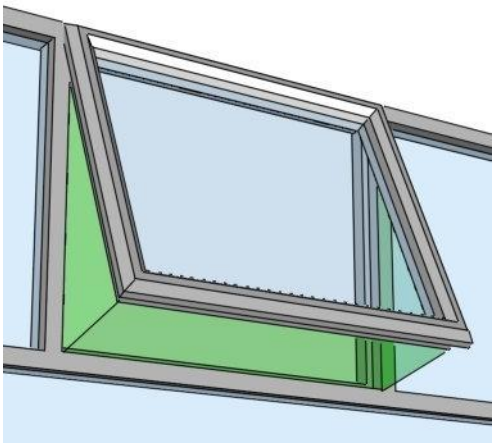
Also the number of hours in the school year used in these calculations shall be based on normal daytime occupancy of a teaching space and shall not take into account possible after hour's use of it.

The optimum working solution will require window openings at both high and low level located at suitable intervals across the full structural width of the window plane and not have high or low level openings confined separately or combined at just one side.

It is important to remember that the final window design, geometry, opening sections and free areas will be influenced by a significant number of variables such as, the actual room construction, room geometry, occupancy, local weather data, glazing area, orientation, internal heat gains and the air tightness standard. Many of these variables are project

specific and therefore a window design that works on one school may not necessarily work on another, therefore all solutions must be site/ project specific.

For the purpose of calculating overheating in teaching spaces the total opening area at high or low level shall be the sum of the individual opening areas at that level. An individual opening area is the sum of the areas of the plane segments for each opening area (outlined in green/shaded below) rather than the product of the width and the height.



Typical window opening for overheating calculations

All ventilation solutions must be modelled using dynamic simulation to ensure that adequate free area of window openings is provided for airflows into and out of a classroom to reduce odours, to provide fresh air for occupants and to maintain the teaching space temperature within the annual limits for overheating in the space.

The opening stroke on the window design is critical and must be fully determined, demonstrated and frozen at Stage 2a. The high level and low level measured strokes on a window elevation can be different taking into account Health and Safety issues both internally and externally in relation to how far windows can open and the level of the opening sections above ground floor. Care should be taken to ensure that proximity to the windowsill does not reduce the effectiveness of the lower free opening area.

It may be possible to achieve double sided ventilation in smaller schools however this is normally not the case in multi-storey schools.

Designs should be based on single sided ventilation as a first option. If double sided ventilation is proposed it should not present Health & Safety risks for cleaning and maintenance of glazing blinds etc by the provision of high level clerestory windows.

Where single sided ventilation is provided the following must be achieved.

- Maximum room depth shall be 7 metres from the internal face of the window wall. Where a fixed storage area is included on the full extent of the internal wall the depth of 7 metres can be measured from the external window wall to the face of this storage area.

- Window design must ensure that adequate natural ventilation is provided without draughts. To achieve this objective, opening sections must be provided at both high and low level with a balanced distribution along the classroom to ensure no poor air quality/hot spots in the room.

- When calculating the free area ventilation requirements, the actual room construction, geometry, occupancy, weather data, glazing area, orientation, internal heat gains, air tightness standard etc must be included in a full dynamic simulation using a certified simulation system to ensure that any overheating is within the limit specified above. This dynamic simulation must be completed in full no later than Stage 2a.

  This dynamic simulation must be conducted for all window designs in all habitable rooms in the school and shall be used to determine the minimum actual free area required at both high and low level and the positioning of same to deal with overheating. The DoES encourages consideration of a minimum of 50% free area at low level but the final design is a matter for the Design Team, taking into account the site specific conditions included in the dynamic simulation that will apply when in use.

- Opening areas in the middle section of windows can be provided but shall not be used when calculating the opening areas required.

- The lower opening window should have its free area positioned above minimum sill height of 700mm and below 1.5 metres above finished floor level

- The upper part of the window should have its free area above the level of the normal occupancy zone i.e. 2.0 metres above finished floor level

- The upper and lower opening sections must be independent of each other. Side hung opening sections are to be avoided due to draught issues.

The following information in the format outlined below must be included for all rooms as part of a Stage 2a submission.

Room name	Floor	Floor area used for ventilation analysis	High level free area		Low level free area		Total free area and percentage of same based on usable room floor area		Number of hours that the room dry resultant temperature shall exceed 25°C in the school year.
			m^2	%	m^2	%	m^2	%	

Permanent vent openings should be provided at high level in a draught free manner.

Opening sections of windows are not deemed as appropriate permanent background ventilation in habitable rooms.

Where double sided ventilation is provided the above objectives with the exception of the room depth must be achieved.

Opening roof lights that require to be manually or automatically closed during rain are not to be used when calculating ventilation requirements.

Passive stack effect ventilation is not deemed appropriate unless a stack effect of greater than 10 meters rise can be achieved, the stack does not impede on the layouts of the rooms

above and the resulting stacks are dedicated only to the room being served, stacks cannot be shared due to acoustic and fire separation requirements.

All other ventilation requirements will be as per DoES TGD - 002.

When designing windows Design Teams should ensure that:

- All glass below 800mm is safety glass, (it should be noted that safety glass is more expensive)
- Safety glass, unless agreed in advance with the DoES due to localised issues, should not exceed 15% of the total glass area in a classroom window design and must not be used above a height of 1 metre above the finished floor level (this is to minimise installation and ongoing maintenance costs)
- Safety glass is provided in all General Purpose (GP) Room windows above a height of 1metre above the finished floor level for safety reasons
- Schools are not left with large areas of safety glass that in the event of breakage can represent a significant drain on their maintenance budgets and may result in the proper glass not being refitted which in turn could contribute to Health & Safety issues for the school.

5. BLINDS:

It is the responsibility of the Design Team Architect to liaise with the school authority at an early stage in the design process and identify the teaching spaces requiring blinds.

The provision of these shall be included as part of the Fitted Furniture in contracts for new schools and extensions.

Proper choice of electronic data projectors and white boards eliminates the need for black out blinds in teaching in teaching spaces and specialist rooms.

Blinds to windows in teaching spaces shall be manually operated heavy duty contract grade steel tube spring-less rollers, complete with side winder endless ball chain control units and child safety clips appropriately sized for each opening and shall be incompliance with Irish Standard ISEN 13120 – Internal Blinds.

The blind material shall be light coloured dense basket weave sunscreen material.

The blinds must perform such that they eliminate glare to the teaching walls and white/black boards, associated data projection screens and white interactive boards, reduce heat transfer to the room and still permit light transmission to the internal space.

The daylight transmission, solar absorption, openness factor and shading co-efficiency must all be taken into account when selecting the appropriate sun screen shade cloth for the teaching spaces.

Consideration should be given to so as to achieve the above requirements and ensure the blinds are fit for purpose as outlined:

- Light transmission values in the 9% to 12% range

- Solar absorption in the 17% to 20% range
- Openness factor in the 3% to 5% range (3% may be more appropriate in South facing elevations, subject to mock-up on site)
- Optimum shading coefficient

so as to achieve the above requirements and ensure the blinds are fit for purpose as outlined.

Note these are guidance values and should not be taken as absolute selection criteria. Each case must be accessed on its own circumstances.

A full size mock-up for a south facing teaching space with interactive white board and data projector operational must be conducted prior to final selection of the blind material.

Manufacture and installation of the blinds shall comply with the requirements of the Irish standards I.S.EN 13120 Internal blinds - performance including safety requirements.

Materials used in the manufacture should meet the designation of 'flameproof' when assessed in accordance with BS 3120: 1959.

A test certificate as in Appendix C of "Fire safety of furnishings and fittings in places of assembly" should be supplied for each item specified.

Some administration areas such as the Principal's Office and Administration Office may require blinds that allow privacy at night from external viewing. This should be taken into account when selecting blinds for these areas.

6. WHITE BOARDS:

Standard white boards are included in the contract for new schools or extension as part of Loose Furniture.

Electronic inter-active white boards are not part of the contract for a new school or extension. The school authorities will be responsible for purchasing electronic inter-active boards and having them installed by others. They should also ensure that data projectors with the correct light output are provided in teaching spaces thus eliminating the need for blackout blinds in teaching spaces.

There are various types and qualities of white boards on the market for use in schools. It is imperative that the correct quality ones are provided so as to avoid future glare problems in rooms.

The Design Team shall liaise with the school authorities at an early stage in the design process and ensure that they are fully aware of the need to provided appropriate IT equipment that is compatible with the building infrastructure being provided and with a view to identifying the most suitable type for use in the individual teaching spaces.

For guidance on short throw data projectors and interactive white boards in terms of low energy consumption and quality school authorities should check the advice on the NCTE website at:

www.ncte.ie/ICTAdviceSupport/AdviceSupport/AdviceSheets/

7. SERVICES DISTRIBUTION:

The primary mechanical and electrical services distribution where feasible are not to be installed in an exposed manner in new buildings or in retrofit situations. They must be attached to or suspended from the structure and integrated with the building design and finished in a tasteful and easily accessible manner.

The Building Services Engineer shall liaise with the Architect to ensure that suitable anchor points on the structure are available on all ceilings for light fittings, ceiling mounted data projectors are other pieces of equipment especially in rooms where tiled suspended ceiling will be installed.

8. OIL FUEL STORAGE:

8.1 MAXIMUM OIL STORAGE TANK CAPACITY:

When determining the oil fuel storage capacity to be provided the Design Team should consult with the school. If the proposed maximum capacity exceeds 8,000 litres, this should be highlighted at Stage 2a.

8.2 ELECTRONIC OIL FUEL THEFT DETECTION SYSTEM:

All new schools and major school extension projects should include the provision of an electronic fuel theft detection system where oil is the fuel in use.

The system shall be capable of:

- Monitoring the oil tank and automatically providing instant alerts and local alarm for low level, over fill, theft and spillage.

- Delivering alerts via a digital communicator on an intruder alarm installation through to the monitoring station, should the school be connected to such a service.

The alerts shall be from one capacitance sender. They will be instant with all other reporting as required. Selection of the oil tank should try and ensure a maximum oil tank height of 2 metres to facilitate a probe system rather than a transducer type sender system.

The system shall be hard wired to the school, and go to alarm mode in the event of interference with the low voltage power cable serving the unit on the oil tank.

The power/information cable between the school and the oil tank should be routed in the same trench as the interconnecting oil line.

In the case of existing schools where an oil fired heating installation is being refurbished or replaced this system should only be considered where a new oil line is being provided or where minimum trenching is required to connect the school building and the oil tank for power.

9. BOILER PLANT:

9.1 BOILERS:

Where a natural gas supply is available suitably sized stainless steel modulating boilers shall be provided on the heating installation.
In situations where these are being provided:

- Weather compensation shall be provided without a 3-port mixing valve arrangement
- The number heating circuits shall be rationalised e.g. one circuit where feasible
- Zone control shall be via a suitable number of motorised valves provided on the heating circuit.

The boiler room floor area as outlined in the Schedule of Accommodation is the absolute maximum floor area to be provided for the boiler room.

In a new build situation where modulating gas fired condensing floor or wall hung boilers are specified the DoES has no objections to the floor area of the boiler room being reduced so long as:

- Adequate floor space is provided for the equipment being installed.
- Adequate circulation space for future maintenance and replacement of equipment is provided.

9.2 ADDITIONAL FROST PROTECTION IN THE BOILER ROOM:

A suitably rated oil filled electric radiator shall be provided in the boiler room to protect the boiler room against frost damage. It shall be controlled by a frost thermostat located near the boiler room doors.

9.3 INSULATION:

The Building Services Consulting Engineer should ensure that all break tanks, pressure vessels etc in the boiler room are properly insulated and located away from all wall vents and doors.

9.4 PROVISION OF A BIOMASS HEATING PLANT:

Biomass boilers can provide an efficient and renewable form of heating in schools. Research by the DoES has shown that biomass systems can require a significant amount of management input on site at times to ensure that they operate at optimum level and provide reliable heating to the school. This research indicated that this time input may not always be available in schools particularly schools where the Principal is a teaching principal or where there is limited caretaker engagement on site.

To allow flexibility for a school to consider at construction stage or in the future either funding a biomass installation or sourcing renewable heating from an Energy Supply Company (ESCO) the issues below should be allowed for at the design stage. If site constraints or the school location mitigate against the above this should be identified at pre-Stage 1. (An ESCO is a company that designs, finances and supplies, operates and maintains the heating plant and sells the heat to the school at a price that is cheaper than the schools fossil fuel options.)

The boiler room should be located such that a packaged renewable energy plant and an associated storage facility can be located adjacent to the boiler house without causing any disruption to the school or needing any changes to the existing school access infrastructure. This area should be identified on all Stage 1 site plan drawings as well as on all subsequent site plan drawings. It should be kept sterile from the point of view of underground and over ground services. The sterile area required for a biomass boiler and fuel storage unit should be based on the size of the school's potential biomass base heating load and not the total heat losses for the school. Biomass boilers are at their most efficient when operating on full load all the time.

A typical solution is generally based on containerised plant, which is a choice of a 4.5m x 4.5m or 6m x 6m storage area (dependant on boiler size and delivery frequencies) and a standard 6 or 12 metre container to house the heating plant and associated equipment.

By way of guidance the following should be considered:

School base heating load KW	Area* (Width x Length)
Up to 100 kW	4.5m x 4.5m storage (60m^3) plus 6 m container
100 – 200kW	6m x 6m storage (100m^3) plus 6.1 m container
200 – 300kW	6m x 6m storage (100m^3) plus 12.19 m container
> 300kW	6m x 6m storage (100m^3) plus 12.2m (container) but also based on plant dimensions requirements

- Typical arrangement is the container plant room located behind the fuel storage area and the fuel storage area would be located with direct access to the school hard surfaces.

The Building Services Consulting Engineer shall liaise with the other members of the Design Team and ensure that the hard surface access route to the boiler plant is capable of supporting solid fuel delivery traffic. Deliveries may normally be by means of an articulated lorry on larger sites; the Design Team will need to take this into account as a Stage 1 requirement within the External Works Allowance.

Schools will need to be aware that access to the biomass plant by an ESCO supplier should be facilitated at all times.

Suitably sized valve connections shall be provided on the boiler room headers to facilitate the connection of the schools heating installation via a multi-plate heat exchanger to any future packaged renewable energy plant. Also required in the school boiler house (as part of the ESCO package) will be a calibrated heat meter to record actual heat delivered to the school and not that supplied from the boiler. The heat meter should report to the school's heating controls system.

Sufficient room should also be allowed in the layout of a boiler room to accommodate a future multi-plate heat exchanger and heat meter in the event of a school progressing with an ESCO.

The Design Team should discuss the ESCO option in full with the school at pre-Stage 1 design development.

10. HEATING CONTROLS:

10.1 BOILER HOUSE CONTROLS:

A Building Management System (BMS) outstation shall be provided in the boiler house control panel and linked to a front end display on the PC in the Principal's Office.

10.2 ZONE CONTROLS:

The zone strategy shall include the following features:

- Individual time control shall be provided on the boilers and the main heating zones.
- Temperature control to each teaching space and corridor areas shall be 2-port control valves and room thermostats.
- Where feasible heating circuits shall be reduced to a single pumped circuit in the school with variable temperature LTHW distribution with a variable head pump. As temperature or time dictates each control valve would open or close to control the temperature in each space.

The Building Services Consulting Engineer shall liaise with the school authorities at an early stage in the design process and identify any spaces in the building that are likely to be used after hours.

Local controls that will facilitate this function shall be located in the Administration/General Office in the school or some other suitable location agreed with the school authorities.

10.3 TEACHING SPACE CONTROLS:

Each teaching space and Staff Room shall be controlled via two port motorized valves with electrically powered digital thermostats with a lockable range up to a maximum of 22ºC.
It is not a requirement that these be wired back to the control panel in the boiler house.

11. PIPING SYSTEMS:

11.1 ALTERNATIVE PIPING SYSTEMS:

Alternative piping systems other than mild steel and copper for the heating and water services in schools may be used provided they are considered by the Building Services Consulting Engineer to be certified to the appropriate standards, fit for purpose, adequately supported and will be installed as per the manufacturer's instructions.

Any system being considered must meet the DoES guidance document requirements in relation to piping qualities, longevity etc.

It must be:

- Robust enough for use in schools
- Capable of being connected to for adjustment and alteration at a future date without the need for a school authority to employ a specialist contractor with special tools etc to perform any cut ins
- Capable of being repaired without having to be replaced at seals and joints

It should also have the same longevity as standard pipe work and shouldn't present higher distribution pressure loss than standard systems.

In the case of small diameter multilayer type pipes the following will apply

- The visual aspect, strength and stability of these must be taken into account when considering their use.
- Pipes of this type should only be deployed at high level in non-exposed areas in schools.
- No vertical drops or low level pipe runs shall be provided as there is a risk of mechanical damage to the pipes in schools.
- Where rolled pipe coils are used they must be deployed as per the manufacturer's instructions and using a proper pipe straightener.
- Final connections to all heating and sanitary fittings in the normal school areas must be in robust, non-flexible pipe. Flexible connectors are not acceptable.

11.2 External Heating Mains:

In refurbishment projects or extensions utilising the existing boiler rooms, where the provision of external heating mains is the most appropriate solution, pre-insulated pipes designed for use underground shall be used with lengths kept to an absolute minimum.

They shall generally not be provided on new school projects but if absolutely necessary must be identified at Stage 1.

12. Mains Water:

12.1 Water Supply:

The main water supply pipe feeding a school building shall be located at a minimum of 900mm below ground level and shall be maintained at that level until it has entered the boiler house. The water main shall rise from the floor towards the back of the boiler house and away from the entrance door to minimise the risks of freezing.

All mains water storage tanks shall be internal and located within the roof space. External tanks or tanks housed in enclosures mounted on the roof are not acceptable for health and safety reasons.

Ball cocks only are to be used on the mains water inflow to mains water storage tanks in the roof space. Motorised valves and float switches shall not be specified or used.

Mains water shall be provided to the sink units in the classrooms and the sink units in the Staff Room and Servery. It is not required at wash hand basins in toilet areas. Given that there is drinking water provided in every classroom there is no need for additional drinking points internally in the school. External drinking points shall be provided as per TGD - 002.

The Design Team shall check the quality of the local water supply. Where considered necessary water softening installation and/or water treatment installation shall be provided on the mains water supply to the school. This shall be detailed, designed and costed at Stage

2a together with indicative running costs including estimates of annual chemical consumption and cost.

12.2 ACCESS TO WATER TANKS IN ROOF SPACES:

Access to water storage tanks in roof spaces shall be via local trap doors located in suitable locations in ceilings adjacent the tanks. The Building Services Consulting Engineer shall liaise with the Architect at an early stage during the design development and agree suitable locations for the tanks and associated trap doors.

Easy all round access shall be provided at all tank locations.

Trap doors in ceilings shall be sized so as to facilitate the replacement of sectional type water tanks in the future.

Trap doors shall not be located directly outside the entrance doors to rooms, presses etc.

Each trap door shall be complete with an attic ladder to facilitate easy access to the water storage tanks for future maintenance and replacement of tanks.

One or more light fitting, controlled by a light switch located adjacent the trap door in the attic, shall be provided in suitable locations above each water tank to provide light for access and future maintenance. A neon indicator light labelled “Attic Lights” shall also be provided on the ceiling in the corridor adjacent each trap door to indicate when the lights are switched on.

The Building Services Consulting Engineer and Architect shall discuss and agree on the type of roof insulation being provided at an early stage in the design development. Where the insulation zone is at ceiling level suitable insulation solutions shall be provided at each trap door.

13. RAINWATER HARVESTING:

A rainwater recovery system shall be provided unless particular site constraints or features render it excessively difficult and/or expensive to install. Recovered rainwater shall only be used for flushing toilets and to feed ground maintenance taps. (Ground maintenance taps should only be located in locked external store rooms or plant rooms and where feasible incorporate removable handles.)

In contracts for new schools or extensions to schools:

- All costs associated with the above ground external rainwater pipes etc and the internal rainwater recovery and distribution system within the building should be included within the Basic Building Cost (BBC)

- <u>All external works are to be included as Abnormal Costs</u>

Where a project is an extension to an existing school, the rainwater recovery system shall only be applied to the new build areas where there is a compatible demand in the extension for toilet flushing using rainwater recovered. In some cases feeding existing toilets from the rainwater recovery system may be economically feasible and merit further consideration.

A technical evaluation of this including all associated costs should also be carried at an early stage in the design process and reported on no later than Stage 2a.

Where a project is an extension to an existing school and where the existing surface water drains are being replaced the rainwater recovery system tank shall be supplied with water from both the existing school building and new extension down pipes.

Where a project is in the first phase of development and subsequent phases have been quantified and are planned, the underground rainwater storage system should be sized on the final development capacity. This should be highlighted in the Stage 2a submission.
Rainwater shall only be gathered from the roof surfaces through the gutters and piped directly (no open gullies permitted) to be collected in an underground holding tank

Surface water from car parking, paving etc. should not be connected to the rainwater collection system.

The Design Team shall ensure that no back flow from the surface or foul main can enter and contaminate the underground rainwater storage tank.

When sizing the underground storage tank a balance needs to be established between daily rainfall potential and daily water demand in the school so that system efficiency is maximised. There are no significant benefits to using oversized tanks. The practice of storing seven days water usage underground as a standard sizing method should not be automatically applied to a school building. In medium schools (up to 16 Classrooms) seven days storage which includes the gravity tank capacity in the school should be considered as the maximum end of the storage spectrum, in larger schools (24 to 32 classrooms) consideration should be given to five day storage as the maximum end of the storage spectrum.

Slightly undersized tanks will assist in avoiding stagnation which could become an issue leading to the fouling of the water system and the generation of odours. This practice will also ensure that underground tanks fill up regularly allowing the surface skim to decant via the overflow.

An accessible proprietary leaf filter shall be provided on the inlet to the underground tank. When selecting leaf filters the following must be taken fully into account.

- Domestic basket type filters and weir filters are not to be used, these can trap vermin and be very smelly and unhygienic.
- The filter must have the correct inlet and outlet pipe sizes and the pressure head drop across filter must suit the application.
- If located in a coastal environment consideration should be given to requirements for sand filtration.

A filter must also be fitted to the overflow outlet to surface water drains.

Water shall be transferred from the underground tank to a rainwater storage tank within the school roof space by a submersible pump located in the underground tank. The pump must be of a commercial grade and connected to a clearly labelled control panel (located in the boiler room) to allow remote monitoring and resetting. The suction line of the pump shall be connected to a controls system that will manage the system with depth sensors etc located in the rainwater storage tank in the roof space. This will also ensure that the water level in the rainwater storage tank within the roof space is always checked prior to allowing mains water (operated through a solenoid valve) to top up this tank. Audible alarms shall be fitted on this panel to indicate malfunction of the pumping system.

A 120 micron filter shall be fitted on the interconnecting pipe between the underground tank and the rainwater storage tank in the roof space. It shall be located in an accessible position in the boiler house with easy access for maintenance checks.

A water meter shall also be fitted on the delivery side of this filter to allow the school to monitor and record the daily, weekly, monthly and annual rainwater usage in the school. See Section 30.1 below for further details.

The rainwater storage tank in the roof space shall be a Format 30 type tank with storage based on 10 litres per pupil. It shall feed a clearly identified colour coded gravity rain water distribution system to feed WC cisterns only.

Storage in the normal Format 30 mains internal water storage tank for ablution should be based on 2.5 litres per pupil excluding showering allowances for PE Halls.

To prevent contamination of the collected rainwater and the backup potable water supply and to prevent accidental ingestion, the system should have:

- Collection pipe-work clearly marked
- All rainwater distribution pipe-work clearly marked in accordance with BS 8515:2009 and BS 1710: 1984 identification of pipelines and services
- Clearly labelled grounds maintenance taps supplying rainwater. (These should only be located in locked external store rooms or plant rooms and where feasible incorporate removable handles)
- An AA type air gap, conforming to IS EN 13076, fitted at the potable water top up point
- Ball cocks only are to be used on the rainwater harvesting inflow to the rainwater storage in the roof space. Motorised valves and float switches shall not be specified or used.
- A non-return valve fitted on the overflows
- An anti-rodent device fitted to the overflow systems
- A manual drainage facility piped to the exterior like an overflow pipe on the rainwater roof space tank for drainage independent of the distribution pipe work.

The Operation and Maintenance manual handed over to the school authorities should detail specific measures to be taken in order to ensure Health & Safety in the use of this system. This may entail treating the stored water prior to start of the new school year with an additive e.g. chlorine or iodine tablets, being added to the storage tanks.

14. WATER SERVICES:

Where necessary hot & cold water services and drains shall be provided to the dish washer, washing machine, tumble dryer (including condensing type) in the Servery and Staff Room. Local isolating valves shall be provided on the water supplies to all wash hand basins, sink units and toilets to facilitate future maintenance and replacement of fittings etc.

15. HOT WATER CONTROLS:

All thermostatic mixing valves are to be located such that a maximum dead leg of 1 metre only is achievable on the blended water supply.

All thermostatic mixing valves (TMV) must be of a TMV3 standard with fail safe lockable thermostatic mixing valves limiting the temperature to 42º / 43º Celsius.
Where wash hand basins are adjoining or back to back one TMV shall be installed in accordance with manufacturer's instructions to supply the wash hand basins.
All TMV must:

a. Be suitable for the system head pressure available
b. Comply with BS EN 1287 for low pressure
c. Be suitable for under basin installation
d. Provide safe thermostatic shutdown
e. Be complete with isolation valves, check valves and easily removable strainers
f. Have tamper proof temperature adjustment and lockdown.

TMVs serving wash hand basins should be selected to give a flow rate of 0.1 l/s at an inlet head of 1.5m.

All TMVs shall be tested for shut-off in the event of loss of the cold water supply and test certificates included in the handover documentation outlined in Section 33 below.
TMVs must never be connected to the mains water supply.

They must only be connected to the hot water distribution services and cold water distribution services as detailed on the Thermostatic Mixing Valve Installation drawing, RT – TMV – 001 in the appendices to this document.

A manual mixing tap, where the hot and cold water only mixes on exiting the spout outlet, must only be used with main water so as not to contaminate the mains water supply.

On all sinks the temperature controlled mixed supply should be taken from the under sink TMV outlet to the hot water inlet on the manual mixer. A mains water supply shall be connected to the cold water inlet side on the same manual mixer tap.

Note that it is possible to obtain percussion taps and TMVs with different pressure drops and if ones with a particularly high pressure drop are specified then they may not work with a gravity system.

The typical flow rate from a wash hand basin tap is 0.1 litres/sec; this is the same as 6 litres/minute.

If the pressure drop of a selected thermostatic blending valve is say 0.12 bar (1.2m) and the selected automatic closing tap has a pressure drop of say 0.2 bar (2.0m), then the total pressure drop across the terminal is therefore 1.2m plus 2.0m and equates to 3.2 metres

This means that the pressure provided by the cold water storage tank must be greater than this plus whatever pressure drop is produced by the distribution pipe work.

Note the cold water supplies in schools must be gravity based, pumped systems are not permitted as the school WC's must be capable of operating in the event of a power failure.

16. SANITARY WARE:

The provision of WCs incorporating concealed cisterns is acceptable provided future maintenance and servicing of the cisterns is not comprised.

For further information on sanitary ware please refer to TGD - 021.2

17. UNDERGROUND ELECTRICAL SERVICE DUCTS:

Separate underground service ducts shall be provided on the electrical installation to cater for each of the following:

- Incoming electrical supply
- Incoming telecom supply
- Local cable TV service where one is available
- Sub-main cables between stand alone buildings
- ICT cables including fibre optic cables between stand alone buildings
- Communication cables between stand alone buildings
- Protective services cables between stand alone buildings
- Spare duct with draw wire for future service connections between stand alone buildings

They shall consist of suitably sized plastic pipes incorporating long sweeping bends and where considered necessary suitable access chambers, draw pits and jointing chambers to facilitate the installation and replacement of cables.

Suitable pre-formed duct bends that meet the requirements of the cable manufacturer for bending radii should be used at ends of duct routes where cables rise out of the ground.

The ducts shall be located at a minimum of 600mm below finished ground level and in such a manner that they are outside the zones identified for future extensions to the building.

Where necessary a yellow warning tape with a black legend should be provided for duct identification.

18. ELECTRICITY CENTRE:

Dedicated main switchgear rooms are not required in most primary schools. In the majority of cases these will only be used as additional storage space in the school and this will prevent easy access to the main switchboard in the event of an emergency and for maintenance. The preferred location for a mains switchboard is in a suitable recessed press within 2m of an external door.

However where one is considered necessary in larger primary schools e.g. 32 classrooms plus, the Building Services Consulting Engineer should highlight this at the Pre-Stage 1 meeting and justify the need for one.

Electrical switch rooms and switchgear cupboards in schools shall not contain elements of the mechanical installation in the school. Under no circumstances should pipe work or duct work be routed through these areas.

19. POWER DISTRIBUTION SERVICES:

Additional power points necessary to cater for a microwave cooker, a dishwasher and fridge etc shall be provided in the Servery.

20. LIGHTING INSTALLATION:

20.1 INTERNAL LIGHTING:

As a minimum IP 40 type surface mounted high frequency linear fluorescent light fittings with prismatic diffusers shall be used in all teaching, circulation and General Purpose areas.
.
Recessed and suspended light fittings should be avoided in schools. The fittings are to be surface mounted to ensure no shadow at high levels on the walls as would occur with recessed and suspended fittings. Diffusers are used to contain lamp shards and ensure occupant safety in the event of a lamp shattering.

All linear fluorescent fittings in schools shall also have screw-in end fittings to ensure diffusers do not detach over time due to thermal deflection.

In single toilets one linear high frequency fitting serving both the WC and wash area shall be specified.

All Disabled WCs in schools should have a minimum light level of 200 lux at 700mm above finished floor. In all other toilets it should be 120 lux.

Light fittings must comply in full with the DoES Technical Guidance Documents and must be signed off by the Building Services Consulting Engineer at the hand over stage on the contract. Responsibility for this lies with the Building Services Consulting Engineer.

All light fittings shall be properly adequately supported and the fixing methodology shall be compatible with suspended ceilings where installed.

Artificial lighting power consumption levels of 2.5 watt/m² per 100 lux shall be the maximum in all areas in schools.

Push type light switches shall be provided in all areas where lighting controls as outlined below are being provided. Standard rocker type switches shall be provided in all other areas except stores etc where switches incorporating auto time delayed release are the norm. Secret key switches shall not be used on lighting installations in teaching spaces, offices etc.

All lighting installations operating in conjunction with automatic dimming to “Off” lighting controls and absence detection must have manual “On/Off” switching arrangements via push type light switches.

Lighting control in teaching spaces should be such that all lights in the space are linked to just one detector such that all lights respond in the same manner to the automatic control signals.

The detectors shall be ceiling mounted and incorporate 3 control elements:

- Photo Cell Control
- Day Light Control
- Absence Control

Lighting controls in teaching spaces are to be based on photo cell control to turn off lights where daylight levels are adequate, daylight sensing to dim lights as required to "Off" in response to changing daylight levels and absence detection to turn off lights when rooms are not occupied.

Lighting installations in the classrooms shall be programmed to switch off after 3 minutes of inactivity and in the corridor areas after 5 minutes.

The lighting controls should be set up so that a light level of 300 lux is always available at 700mm above finished floor level in general teaching spaces.

Manual control shall be provided on corridor lighting and shall be zoned to take account of areas where natural daylight is available and where it is not.

In addition sections of corridors that:

- Benefit from daylight influences via local external glazing shall have lighting controls as outlined above so that a light level of 120 lux is always available at 700mm above finished floor level.
- Don't benefit from daylight influences shall have local PIR controls

In 16 classroom schools and over, dedicated key operated main isolating switches shall be provided to control the corridor lighting. These shall be located adjacent to the keypads on the intruder alarm installation at the main entrance to the school and at the main entrance to the GP Room and ancillary accommodation.

The Building Services Consulting Engineer shall ensure that the following are included in the tender documents as a guide to those tendering:

- A detailed account of the lighting control being specified in teaching spaces
- Details of the settings to be applied to detectors i.e. lux levels, sensitivity levels and time lag
- A detailed account of how they will operate

A commissioning certificate to be completed by the contractor and detailing the settings to be provided on the various detectors shall form part of the tender documents. It shall be completed and handed over to the Building Services Consulting Engineer prior to commissioning of the lighting controls.

Minor revisions are required to the local lighting installation in rooms as outlined in Section 23.3 below.

Lighting Controls in en suite toilets shall be based on manual "On/Off" switching with automatic absence detection only.

Access lighting for water storage tanks in the roof space as outlined in Section 12.2 above shall be provided.

20.2 EXTERNAL LIGHTING:

Where possible, external lighting shall be mounted on the school building. Where this is not possible hinged lamp standards shall be provided in areas such as car parks, driveways, pedestrian ways and entrance/exit locations to facilitate future maintenance and replacement of lamps.

It is not a requirement that all external lighting i.e. on the building, in car park areas etc should switch on automatically after the sun sets.

For example external lighting on the building and in car park areas is only required when the building is in use; security lighting is only required when the school is not in use.

The Building Services Consulting Engineer should ensure that the external lighting installation is zoned as outlined below to allow flexibility in its operation and also to conserve energy.

- External lighting mounted on the building to light up pathways around the perimeter of the building and entrance doors to the building *(only required during hours of darkness when the building is in use)*
- Car park lighting *(only required during hours of darkness when the building is in use)*
- Security lighting installation mounted at high level on the building *(only required during hours of darkness when the building is not in use)*

In addition to the normal manual lighting controls provided, separate time clock and photo cell controls shall be provided on the security lighting and car park zones.

The Building Services Consulting Engineer shall liaise with the school authority as part of the design development and agree lighting zones and time clock settings for each zone. These shall be incorporated into the design development.

Time clock and photo cell control shall be provided on the external lighting at the main entrance.

21. DATA COMMUNICATIONS CENTRE (DCC):

In schools with up to 15 classrooms the Design Team shall ensure that adequate natural ventilation via a number of suitably sized high and low level intumescent (if required by Fire Certificate) wall vents in corridor walls and an external vent to atmosphere is available in the DCC. Due care should be taken to maintain any necessary fire compartmentalisation

In 16 classroom primary schools and over, a basic mechanical extract ventilation installation shall be provided in the DCC. It shall consist of a suitably sized in-line fan located at high level in/on the ceiling of the DCC to extract the hot air from the DCC via a suitably sized duct and intumescent grille into the corridor area. The fan shall be controlled by a lockable digital

room thermostat set at 25°C. A passive air intake from outside shall be provided dropping to low level in the DCC to provide make up air to extract system. An insect filter shall be provided on the low level outlet in the DCC to facilitate future maintenance etc. High and low level wall vents are not required in the corridor wall.

During the design development and at the completion/hand over stage of the building project the Design Team should:

- Point out to the school authority that it should ensure that the walls vents are not covered by equipment, furniture, notice boards etc.
- Brief the school authority on the role of the fan where one is provided and stress the importance of checking it on a regular basis to ensure it is operating. A fan failure may result in damage being done to the ICT equipment in the space
- Point out to the school authority that the DCC is a dedicated space for ICT equipment only and under no circumstances must it be used as storage space.

A sign shall also be provided in a prominent location in the DCC advising the school authority to regularly check that the fan is operating correctly and that failure to do so may result in the DCC over heating and valuable ICT equipment being damaged in the event of the fan not working etc.

Also this space shall not contain elements of the mechanical installation in the school i.e. no pipe work or duct work shall be routed through this space under any circumstances.

In the interest of reducing energy consumption, the Design Team should discuss with the School Authority the principle of virtualisation of the main servers to just one server, this will reduce the communications power consumption, heat gains and running costs significantly, refer also to www.energyineducation.ie for further advice and guidance

When purchasing ICT equipment the school authority should also consider the provision of low energy equipment in the DCC.

22. ICT INFRASTRUCTURE:

The cabling for the primary ICT network shall be Category 6a.

Fibre optic cables shall be provided between the Data Communications Centre (DCC) and any Intermediate Distribution Facility (IDF).

Where a school Authority wish to consider a wireless installation, this should be highlighted at the pre- Stage 1 meeting.

23. DATA PROJECTORS:

Data projector installations as outlined below shall be provided in classrooms in primary schools.

The school authorities will be responsible for purchasing data projectors and having them installed by others. They are not part of the contract for a new school or extension.

Proper choice of electronic data projectors and white boards eliminates the need for black out blinds in teaching in teaching spaces and specialist rooms.

For guidance on short throw data projectors in terms of low energy consumption and quality school authorities should check the advice on the NCTE website at

www.ncte.ie/ICTAdviceSupport/AdviceSupport/AdviceSheets/

In the case of existing schools that may be transferring equipment from the existing building to a new one the Building Services Consulting Engineer shall consult with the school authorities and seek clarification on the type of data projector being provided and in which rooms these will be located in the new building.

23.1 TYPES OF DATA PROJECTORS:

Two types of data projectors are being provided in primary schools:

- **SHORT THROW PROJECTOR:**

  These shall be mounted on a suitable wall bracket above the centre of the white board on the teaching wall in the classroom.

- **SHORT THROW PROJECTOR AND INTERACTIVE WHITE BOARD:**

  These shall be mounted on a suitable wall bracket above the centre of the white board on the teaching wall in the classroom.

  The interactive white board shall be located at a suitable height above floor level in the centre of the teaching wall.

23.2 LAYOUT OF SERVICES:

The layout of the services shall be based on the DoES classroom layout drawing for primary schools TGD - 022 - D01 & D02 available on the DoES website www.education.ie .

The location of the network point and associated socket outlets in the dado trunking on the teaching wall in the primary school classrooms is flexible. The location shown on the room layout drawing is only for guidance purposes. The Design Team shall liaise with the school authority at an early stage in the design development and agree exact locations for the teacher's base and the associated network and socket outlets in individual classrooms.

The Building Services Consulting Engineer shall liaise with the school and equipment installers to ensure that the installers use the compartment trunking for their interconnecting cables; they should not install additional trunking or exposed cables in the teaching space.

23.3 LIGHTING INSTALLATION:

In addition to the normal manual switches provided in teaching spaces, manual switching shall be provided on the row of light fittings nearest the teaching wall so that the teacher may switch these off if local glare on the whiteboard is a problem.

Two way switching consisting of a dedicated switch at the main switch location in the room and one in the dado trunking on the teaching wall adjacent to the teacher's base shall be provided.

23.4 COORDINATION:

The Building Services Consulting Engineer shall liaise with the other members of the Design Team to ensure that all elements of the works required are properly co-ordinated and fully detailed in the tender documents and on the drawings to facilitate those tendering.
For example the heights of white boards above floor level, the exact locations of any screens above white boards etc need to be known and indicated on drawings so that the contractor installs trunking runs etc in the correct locations.

24. COMMUNICATION SERVICES:

24.1 PUBLIC ADDRESS SYSTEM:

A suitable number of external horn type speakers shall be provided to cover the play areas around the school building. Care should be taken when locating these to avoid intrusion on neighbouring properties.

These shall be mounted at high level on the building and connected to the public address/class change bell system in the school.

A dedicated output socket shall be provided near the entrance door in the PE Equipment store off the GP Room to facilitate a connection between the school's PA system and the local Induction Loop System being provided in the GP Room.

24.2 INDUCTION LOOP SYSTEM:

A suitable induction loop system shall be provided in the GP Room.

In smaller schools where there is no PA system and where one is not being provided, a stand alone induction loop system shall be provided in the GP Room.

Where there is an existing PA system in the school, or where one is being provided, the induction loop system in the GP Room shall be linked to the PA system.

The amplifier on the induction loop system shall be located on a suitable shelf inside the door in the PE Equipment Store. It shall incorporate a minimum of two audio input sockets, one for the permanent link via the audio socket outlined in Section 24.1 above to the school PA system while the other one is available for a link to a stand alone PA system that may be provided by others in the future for functions in the GP Room..

The school authority will be responsible for the provision of an Induction Loop system, if required, at the hatch in the secure lobby at the main entrance. The Building Services Consulting Engineer should ensure that a suitable power point to cater for this is provided at this location.

24.3 TELEPHONY:

The guidelines relating to PABX and direct line facilities in various sizes of primary schools have been revised to include the following:

1 – 4 CLASSROOM SCHOOLS:

3 lines: to PBX; Fax/Digital Subscriber Line (DSL); Alarm [Direct Dial Inwards (DDI) Block]

1 – 8 CLASSROOM SCHOOL:

3 lines: to PBX; Fax/DSL; Alarm/Lift; [DDI Block 10]

1 – 16 CLASSROOM SCHOOL:

4 lines: to PBX; Fax/DSL; Alarm/Lift; [DDI Block 20]

The above is a general guidance and should be adapted to the local situation, e.g. broadband connectivity (DSL/Satellite/Fibre) and availability/cost of ISDN service, to provide a value for money service to meet the school's needs. This matter should be explicitly addressed at Pre-stage 1.

All phones shall be wired in Category 6a cables.

Where considered necessary the school authorities may elect to install a pay/card phone for general use.

Incoming telephone cable ducts shall be terminated in the Data Communications Centre. Enabling provision i.e. additional ducts and draw wires shall be included to facilitate the provision of extra in-coming lines if the school expands.

An open duct policy, where by the ducts provided are under the ownership of the school and are available for use by any service provider, shall apply and shall be maintained on all projects.

To achieve this, manholes shall not be fitted with branded manhole lids supplied by the utility companies to the contractor. Only unbranded manhole lids must be used. This is to ensure that the school authorities own and control the ducting network to their school and will have the freedom to change service providers as they wish up to the boundary of their property.

The Contractor shall be responsible for the order charges and line rental for all lines until the school authorities take over the building.

25. LIFT:

Hydraulic or traction type passenger lifts shall be provided in all new school buildings.

In the case of an extension to a school building where the Design Team has identified the need for a lift in the new extension a passenger lift shall be provided.

Where a lift is required in an existing school building a platform type lift shall be provided.

The dimensions of the lift shall be as outlined in the TGD - 002.

The Design Team must also ensure that any recorded announcements in the lift provided are in compliance with requirements the Official Languages Act 2003.

26. PROTECTIVE SERVICES:

26.1 DOOR ENTRY SYSTEMS:

26.1.1 NEW SCHOOLS:

Each school must have a secure lobby at the main entrance to the school with a natural view of the front entrance door area through it from a hatch in the Administration/General Office wall.
The hatch in the office wall should be robust, lockable and should be capable of withstanding physical assault.

A bell push connected to a buzzer in the Administration/General Office shall be provided on the wall outside the hatch.
A rebated mortise electromagnetic type lock located in the upper horizontal frame of the internal door in the secure lobby shall be installed. It shall be controlled by a release switch located in the Administration/General Office and incorporate an appropriate power supply with stand-by battery to power this unit.
An egress button shall be located in the proximity of the door to allow individual exit from the school.

The unit must de-energize releasing the door in the event of the fire alarm activating.

26.1.2 EXISTING SCHOOLS:

26.1.2.1 SCHOOLS WITH AN ENTRANCE LOBBY:

In existing schools where the Administration/General Office is remote from the main entrance lobby area and from which there is no natural view of the front entrance door lobby a simple *two-way voice communication entry system* between the lobby and the Administration/General Office shall be provided. It shall be complete with a *remote release facility* and shall control the internal door in the lobby.

26.1.2.2 SCHOOLS WITH NO ENTRANCE LOBBY:

In existing schools where there is no entrance lobby a simple door entry system capable of two-way communication between the entrance door and the Administration/General Office shall be provided. It shall be complete with a remote release facility and shall control the external entrance door to the school.

TWO-WAY VOICE COMMUNICATION ENTRY SYSTEM

The unit shall be a flush mounted stainless steel entry panel incorporating an integrated buzzer button, microphone and speaker. It shall be wall mounted in a suitable location in the secure lobby. When mounted externally (where there is no entrance lobby) it shall be located on an external wall adjacent the external entrance door.

An internal wall/ desk mountable handset with release button shall be located in the Administration/General Office area. Toggle switches shall be installed so that the intercom handsets can be switched off during staff breaks**.**

REMOTE RELEASE FACILITY

A magnetic lock shall be provided on the internal side of the door frame with correct mounting brackets and appropriate power supply unit with standby battery to power this unit.

An egress button shall be located in the proximity of the door to allow individual exit from the school. The unit must de-energize releasing the door in the event of the fire alarm activating.

26.2 DOOR BELL:

A door bell as outlined in DoES TGD - 002 shall also be provided outside the main front door to the school.

26.3 FIRE ALARM SYSTEMS:

Where a GP Room and associated ancillary accommodation is attached to a school a fire alarm repeater panel shall be provided at the main external entrance to this area. It shall be wired back to the main fire alarm control panel in the school.

Integral covers shall be provided on all key operated re-settable type manual call points on fire alarm installations in schools.

The Building Services Consulting Engineer should ensure fire alarm sounders are not located near outstations on Emergency Voice Communication Systems in Disabled Refuge Areas in schools.

26.4 EMERGENCY VOICE COMMUNICATION SYSTEMS (EVC):

The Building Services Consulting Engineer shall liaise with the other members of the Design Team at an early stage in the design of multi-storey school buildings with a view to identifying suitable Disabled Refuge Areas for the disabled.

These are relatively safe locations where pupils or staff members who cannot easily use fire escapes can call for assistance and wait until help arrives e.g. the top of stairwells or other suitable locations identified in the school.

The Building Services Consulting Engineer should ensure that fire alarm sounders are located away from Disabled Refuge Areas so that in the event of an emergency those using an outstation can hear what is being relayed to them over the sound from the fire alarm.

A suitable two-way Emergency Voice Communication (EVC) system shall be provided in the school. It shall consist of a stainless steel hands free vandal resistant outstation located at each refuge and linked to a central monitoring station in the Administration/General Office.

Any system provided in a school shall be capable of being expanded at a later date should the school be extended in the future.

26.5 INTRUDER ALARM:

The intruder alarm installation shall incorporate a connection for an electronic fuel oil theft detection system as outline in Section 8.2 above.

In the interests of conserving energy and reducing future energy costs for the school authority it is not a requirement that all car park lighting be switched on in the event of the alarm being activated during hours of darkness. External light fittings mounted at high level on the building only should be activated.

27. RENEWABLE ENERGY IN PRIMARY SCHOOLS:

27.1 SOLAR WATER HEATING:

Solar power for hot water generation is not considered an optimum design solution for primary schools due to the school's operating profile (closed during summer months mid terms etc, short days and closed at weekends), and a minimum and irregular hot water demand.

For example a typical 16 classroom school is supplied with an 80 litre hot water cylinder, if a solar installation is provided, this would have to increase to a minimum 300 litre cylinder. This significant additional water quantity for which there is no significant demand would require heating using fossil fuels for the majority of the schools operation hours, thus increasing running costs to a school, not reducing them.

In Special Schools for pupils with special educational needs where there is a significant hot water demand for therapeutic baths and there are opportunities for solar hot water to assist in meeting this demand solar hot water generation can be considered. The Building Services Consulting Engineer should investigate and report on the option of providing solar water heating, including a detailed breakdown of all associated costs, as part of the Stage 2a M&E submission.

27.2 BIOMASS FUEL FOR HEATING:

Biomass fuel is considered carbon neutral (excluding transport impact) provided the fuel is sourced from short rotation crops, waste from managed forests and waste from parks management and is viewed as compliant in terms of minimum regulatory carbon saving commitments.

In 2006 the DoES commenced a unique project in relation to biomass energy use in schools to evaluate the suitable application and performance and compatibility of biomass systems. The evaluation process included school heating requirements in terms of heating demand characteristics, controls, reliability, fuel storage and maintenance and operation and customer satisfaction.

Based on the above study biomass heating in schools cannot be deemed an exact fit and will need further development to target this area. It is considered that the biomass industry needs to respond nationally with some type of quality assurance scheme similar to that now in place for biomass fuel supply. It is also considered that it will prove difficult to match the small schools in the country with biomass heating on an operational and costs basis.

There is a potential market for Energy Supply Companies (ESCO) to provide a heat contract to schools based on biomass heating, where the ESCO finances, operates and maintains the system and sells heat to the school, again economies of scale will feature here. Please see Section 9.4 above for outline guidance on how this might be provided in schools.

Visit www.energyineducation.ie for further details on biomass heating systems in schools.

27.3 PHOTOVOLTAIC ARRAYS:

The DoES is currently researching the provision of photovoltaic (PV) installations and assessing the future potential of this type of installation in schools.

The research includes evaluating and testing the suitable application, performance and compatibility of photovoltaic in schools in terms of electrical demand characteristics, controls, reliability and maintenance and operation.

Photovoltaic arrays presently are not considered viable in schools given the high capital cost and absence of a feed in tariff for schools unless they have an existing supply that meets the ESB Networks tariff criteria.

27.4 WIND GENERATION:

Wind turbines are generally installed in locations that are not regularly frequented and where the risk to the public from any blade failure or detachment is low.

There are significant Health & Safety issues associated with wind turbines. These will be enhanced for school authorities if turbines are located on school sites where there are highly occupied playground areas.
There is potential for a sudden catastrophic failure due to extreme wind conditions, poor maintenance or unpredicted component failure. This must be taken into account by school authorities and their Design Teams where considering the provision of wind turbines.

In some cases the risks associated with this may be diluted by using a restricted exclusion zone around a turbine. However the enforcement of an exclusion zone that exceeds the maximum distance for tower collapse or rotor blade throw would in most instances preclude a wind turbine being located within school grounds as it would result in reduced available or playground space.

Given the above, the DoES position is that school authorities would be better to consider purchasing wind generated electricity from one of the wind generating companies than to attempt on-site generation.

28. SPECIAL EDUCATIONAL NEEDS ACCOMMODATION:

DoES TGD – 026 Planning & Design Guidelines, Primary & Post Primary School Specialist Accommodation for Pupils with Special Educational Needs outlines what is required and provided in this type of accommodation in primary schools.

29. BER CERTIFICATION:

All school buildings must now comply with the requirements of the Energy Performance Buildings Directive (EPBD) on all building projects. The relevant legislation is Building Energy S.I. No. 666 of 2006 European Communities (Energy Performance of Buildings) Regulations 2006 and subsequent legislation.

This directive is part of Europe's strategy to meet their commitments to the international Kyoto Protocol which took the form of an agreement to limit emissions of green house gases.

The key requirements of the EPBD are:

1. Consideration to be given to the provision of alternative energy systems in the design of any large building

2. All public buildings (>1000m^2) will require an Energy Performance Certificate displayed in a visible location

The DoES has taken the view that all new schools regardless of size and extensions greater than 500m² will require an Energy Performance Certificate displayed in a visible location.

29.1 THE PROVISION OF ALTERNATIVE ENERGY SYSTEMS:

It is a requirement of the above that consideration be given to the provision of alternative energy systems in the design of any large building (>1,000m²) for which a planning application is made, or a planning notice is published. A person who commissions the construction of a large new building shall ensure, before work commences on its construction, that due consideration has been given to the technical, environmental and economic feasibility of installing alternative energy systems in the proposed large building, and that the use of such systems has been taken into account, as far as practicable, in the design of the building.

The alternative energy systems to be considered shall include the following:

(a) Decentralised Energy Supply Systems Based on Renewable Energy

(b) Combined Heat and Power Systems

(c) District or Block Heating or Cooling, if available

(d) Heat Pumps

The DoES has reviewed the application of the above technologies in school buildings with respect to technical, environmental, economic feasibility and operational issues and concludes that it is not practical to include these applications in the design of a school building at this time. Low energy design has been incorporated in school design on a hybrid basis by maximising natural resources and utilising technologies. Maximising natural resources involves focusing on areas such as passive solar design, good natural daylight, natural ventilation and air infiltration. The DoES has focused on utilising technologies in a number of areas including heating, lighting, water efficiency and air tightness testing; these are incorporated into the DoES Technical Guidance Documents. To avoid unnecessary additional evaluations for each project which do not deliver any further benefit or insight the DoES has produced the following standard guidance following evaluation of alternative energy systems for school projects.

(a) DECENTRALISED ENERGY SUPPLY SYSTEMS BASED ON RENEWABLE ENERGY:

In the interest of sustainability, the potential of renewable energy should be maximised in school design. It is however critical that renewable applications are properly suited to the schools needs and not just applied for the sake of having a renewable tag on a school. It is also critical that the demand for energy is minimised before investing in renewable energy applications. The DoES has been using test schools to evaluate the suitability of renewable energy options for schools for the past eight years.

SOLAR WATER HEATING:

Solar power for hot water generation is not considered an optimum design solution for primary schools due to the schools' operating profile (closed during summer months, mid terms, etc, short days and closed at weekends), and the minimum and irregular hot water demand. A typical 16 classroom school is supplied with an 80 litre hot water cylinder, if a solar installation was to be provided, this would have to increase to a minimum 300 litre cylinder. This significant additional water quantity for which there is no significant demand would require heating using fossil fuels for the majority of the schools operation hours, thus increasing running costs to a school, not reducing them.

Schools for pupils with special educational needs that may have a significant hot water demand for therapeutic baths can present opportunities for solar hot water to assist in meeting this demand.

BIOMASS FUEL FOR HEATING:

For details on this area refer to Section 27.2 above.

PHOTOVOLTAICS:

Photovoltaics (PV) convert the sun's energy to electricity using semiconductor technology.

Currently a research strand is assessing the future potential of PV installations in schools with a 33 kW installation completed and a number of smaller installations on site at constructions stage. The research will evaluate and test the suitable application and performance and compatibility of photovoltaic for electrical generation in schools with school electrical requirements in terms of demand characteristics, controls, reliability, and maintenance and operation.

PV arrays presently are not considered viable in schools given the high capital cost and absence of a feed in tariff for schools unless they have an existing supply that meets the ESB networks tariff criteria.

WIND GENERATION:

The operation of an appropriately sized wind turbine for a school requires significant local operation and maintenance on a day to day basis. There are significant Health and Safety issues with turbines; these are further enhanced when coupled to school sites with highly occupied playgrounds. These risks can be diluted but not eliminated by using a restricted exclusion zone around the turbine. This again adds potential management issues for the school and reduces available space for general school use.

Wind turbines are generally installed in locations that are not regularly frequented and where the risk to the public from any failure is low. Where wind turbines are installed in highly frequented public locations the risk of injury or fatality resulting from a wind turbine failure increases by several orders of magnitude.

Even among good quality small wind turbines, there remains the potential for a sudden catastrophic failure due to extreme wind conditions, poor maintenance or unpredicted component failure. In order to minimise the risk where small wind turbines are installed in highly frequented public areas, the enforcement of an exclusion zone around small wind turbine that exceeds the maximum distance for tower collapse or rotor blade throw would in most instances preclude a wind turbine being located within school grounds.

Given the above, it is the DoES position that a school would be better to consider purchasing wind generated electricity from one of the wind generating companies than to attempt on-site generation.

(b) COMBINED HEAT AND POWER SYSTEMS:

Combined Heat and Power (CHP), also known as cogeneration, is the use of a heat engine or power station to simultaneously generate both electricity and useful heat.

All power plants emit a certain amount of heat during electrical generation: this can be released into the environment via cooling towers, flue gases and by other means. By

contrast CHP captures some or all of the by-product heat for heating purposes either very close to the plant or as hot water for district heating.

To be viable a good base load for electrical demand and heat demand must exist. Such base loads arise where building occupation or process activities are extended or continuous in operation, this is not the case in primary and post primary schools.

A CHP unit cannot provide a school's complete heating energy due to the imbalance between the school's electrical and heating loads, and the fact that a significant proportion of the school's load is required at a time when there is no matching electrical demand in the school.

During warmer months the schools heating requirement drops to an extent where the waste heat provided by the CHP unit can not be used for building heating and hot water usage.

The application of large scale CHP is considered not to be viable in schools for the above reasons. One of the DoES research projects is evaluating the potential for micro/mini CHP units in post primary schools.

(c) DISTRICT OR BLOCK HEATING OR COOLING, IF AVAILABLE:

There is no requirement in primary and post primary schools for cooling and therefore district block cooling does not need consideration.

If a school is being developed in an area with district or block heating then consideration should be given to the potential for connection of the school.

Schools can provide a useful load to district heating systems for periods where residential demand is not at a peak. The viability of the district heating will depend on the proximity of the school to the district heating, the terms of supply and the proven reliability of the district heating scheme or back up provision of the system.

(d) HEAT PUMPS:

A geothermal heat pump system is a heating and/or cooling system that uses the earth's ability to store heat in the ground and water thermal masses. These systems operate based on the stability of underground temperatures; the ground a few feet below surface has normally a very stable temperature throughout the year, depending upon location's annual climate.

Geothermal heating to be efficient in a schools environment must be operated using night rate electricity. Thus just like with the electrical night rate storage heaters of old, this heat must be generated during the night and stored for distribution during the course of the day. This is normally done using under floor heating in a concrete floor.

The DoES has tested a geothermal heating installation; results indicate that the compatibility of the system with the schools passive solar design strategy and operational requirement has been very poor.

The slow response time of the under floor heating has led to overheating in the classrooms when there is good passive solar heat available to the school and also problems with the quick provision of heat if for technical malfunction the heat pump failed to operate the night before.

The use of air to water heat pumps with radiators allows the coefficient of performance (COP) to reduce substantially, the requirement will still exist for hot water at 60°C thus also affecting the COP.

The low generation temperatures of these units result in the need for up to five times the heat transfer surface area which is not practical or cost effective in a school. Electric fan type heat emitters can maximise the potential of these low temperatures but these are not appropriate for use in schools due to maintenance, noise and localised control issues.

It is therefore the conclusion of the research project that while suitable for many other applications, heat pumps are not appropriate for use in schools.

29.2 BUILDING ENERGY RATING – NEW BUILD SCENARIO:

A person who commissions the construction of a non domestic building (e.g. school) on or after 1 July 2008 shall, before such building is occupied for the first time, secure a BER certificate and advisory report in relation to the building and shall produce a printed copy of such BER certificate and advisory report to the building control authority in whose functional area the building is situated, on demand being made by that authority for its production. This BER certificate and advisory report is valid for 10 years and only needs to be updated if there is a change to the building as outlined in SI 666 of 2006. There is no requirement to renew this BER certificate after the 10 years have elapsed unless the building is offered for sale or rent.

The BER must be in place when the building is completed and handed over. There is no legislative requirement that the BER must be completed for the planning application process. Projects that had received planning permission prior to July 2008 had a two year transitional grace period in relation to the BER process. If they were not completed by June 2010 then they had to produce a BER Certificate at handover.

The BER for new non-domestic buildings is calculated using the Non Domestic Energy Assessment Procedure (NEAP). The default software tool in NEAP is the Simplified Building Energy Model (SBEM). SBEM is available from www.seai.ie/sbem. This tool and any other approved by the SEAI can be used. NEAP is also used to demonstrate compliance with certain elements of the Building Regulations Part L.

The provision of a BER Certificate is included in the Building Services Engineer's scope of services on all building projects.

The BER assessor must follow the SEAI/national calculation methodology to calculate the BER and produce the advisory report. The assessment including all input information is to be provided to the DoES prior to commencement of construction and must also be submitted for publication on the National BER Register.

A BER Certificate shall be required for all new works projects. In the case of extensions to existing school buildings it shall only be required for the proposed extension.

As a minimum, a BER Certificate rating A3 must be achieved for primary schools while maintaining the energy requirements of the DoES TGDs.

The following minimum elemental U values W/m² ºK must be achieved:

External walls 0.27 W/m² ºK
Ground floors 0.25 W/m² ºK
All roofs 0.16 W/m² ºK
All glazing 1.8 W/m² ºK

Where necessary U values may need to be increased in order to achieve an A3 rating.

30. MONITORING ENERGY IN SCHOOLS:

30.1 TARGET & MONITORING SYSTEM:

The provision of an Energy Monitoring System on a project is not considered an abnormal cost and should be provided in the following scenarios.

- New Schools
- Standalone extension with its own plant
- Extensions to existing schools where existing plant is being renewed
- Exiting school refurbishments where existing plant is being renewed.

A simple target and monitoring system based on a traffic light format shall be installed in schools to inform relevant personnel in a school, in a quick and understandable manner, how the school's Energy and Utility Supplies are behaving, when set against targeted parameters. This information can be available on the Principal's PC on start up and should also be capable of remote monitoring and alarm via a Global System Mobile Communication system (GSM) to let required personnel know of the problem.

For example:

- If the light is Green, all is fine
- If the light is Amber, there is a problem, but not very serious and can be dealt with accordingly
- If the light is Red immediate action must be taken

The following parameters will be measured:

- Electricity
- Heating fuels
- Mains water to the school (meter located in boiler room)
- Make up mains water to the rain-water storage tank in the roof space (meter located on the dedicated mains feed supply to the rain water storage tank)
- Rain-water to the rain-water storage tank in the roof space (meter located in boiler room as detailed in Section 13)

This system shall be applied to a whole school, i.e. one electrical meter, one fuel meter, two water meters and one rainwater meter or each parameter can be measured for different buildings if required.

The Building Services Consulting Engineer shall liaise with the school authorities and set the desired levels of electricity, water and fuel usage taking into account seasonal adjustments.

The traffic light system shall operate as outlined below and inform the school management if action is required:

LIGHT GREEN:

The electricity, water and fuel usage are within the required bands.

ACTION REQUIRED: None; all is well.

LIGHT AMBER:

Typical Amber situations would occur if a meter indicates that a utility was being delivered for longer than required but then shuts off.

ACTION REQUIRED: The school management should investigate within a day or so.

LIGHT RED:

Typical Red situations would occur where meters are registering energy usage yet the building is not in use.
ACTION REQUIRED: The school management should investigate immediately

30.2 METERS:

As part of the design development the Building Services Consulting Engineer should investigate and discuss with each local service provider the feasibility of providing pulse type meters instead of providing school owned meters, with the intention that the pulse outlets on the meter would be connected to the energy monitoring system.

If this is not possible school owned meters to monitor the use of electricity, water and fuel supplies shall be provided and connected to the monitoring system.

A report comparing initial installation costs and any standing charges for both options together with a recommendation on the preferred type of installation should be included in the Stage 2a submission.

30.3 DISPLAY CENTRE:

In addition to the information being displayed on the Principal's PC it shall also be capable of being displayed through the ICT structure to the teaching spaces.

The display shall show graphs of hourly usage of Electricity, Water and Fuel set against desired targets.

30.4 ENERGY TARGETS REVIEW:

The commissioning engineers as well as the Building Services Consulting Engineer shall return to the school following a full year of operation of the system and in conjunction with the controls company and contractor reassess the targets set and confirm that they are correct and match the school's energy usage profile. If they don't, remedial action shall be undertaken to ensure proper targets are being met and that the system operates correctly.

Where necessary any measurements and remedial adjustments should be applied.

This must be completed prior to release of final retention.

30.5 MAXIMUM IMPORT CAPACITY (MIC):

The Building Services Consulting Engineer and Contractor shall return to the school following a full year of operation and compare the metered electricity consumption against the design target.

They shall advise the school authorities:

- If the target set is reasonable and the applied tariff is correct.

- If there are any benefits to be gained by a lower monthly MIC charge where the MIC is less than the agreed Maximum Demand and where subsequent penalty charges can be avoided.

30.6 POST OCCUPANCY ENERGY INFORMATION FORM:

The Building Services Consulting Engineer shall re-visit the school after it has been occupied and in use for a minimum of 12 months and complete a post-occupancy DoES Energy Information Form (TGD - 006) for it based on actual readings. He shall also prepare a commentary confirming if previous targets have been achieved and highlight the changes if any that have been made to the earlier versions of the form included in the Stage 2(a) and tender stage documents.
A hard copy of these shall be handed over to the school authority for its records.
A second copy of the completed form shall be forwarded to the DoES for record purposes at:

poeif12@education.gov.ie

30.7 POST OCCUPANCY DISPLAY ENERGY CERTIFICATE (DEC):

The Building Services Consulting Engineer shall in consultation with the project Architect complete a Display Energy Certificate (DEC).

On completion of the DEC the Building Services Consulting Engineer should meet with the school authority and the school Principal and discuss the “In Use” energy performance of the school with them.

He should provide written recommendations to the school and the Principal identifying opportunities for the school to improve its energy usage and the DEC rating.

A second copy of the DEC shall be forwarded by e-mail to the DoES for record purposes at:

podec@education.gov.ie

31. DOCUMENTATION:

31.1 STAGE 2A SUBMISSIONS:

Section 2.6 and associated appendices of the DoES Design Team Procedures for Stage 2a Reports (August 2012) sets out the requirements for the Building Services Consulting Engineer’s Stage 2a Report.

The following information must be included in the report:

- A schedule of light fittings

- A detailed account of the actual lighting controls being specified on the project including settings on detectors e.g. lux levels, sensitivity levels and time lag, together with a detailed account of how these will operate

- A detailed account of the wiring requirements including type and size of cables for the various elements of the electrical installation

- A detailed account of the control strategy, including schematic drawings, outlining the proposed method of control and operation of all of the proposed services, in particular with respect to the heating and lighting services
- A detailed account of the Energy Monitoring System as well as specific information on the equipment and associated controls being specified
- Estimated Electrical Load calculation, diversity to be applied to each load type, estimated maximum demand and MIC
- The ratings of all boilers
- The schedule of the radiators
- The sizes of all mains water and rain water storage tanks in the roof space and the underground rain water storage tank

The following information should also be included on the drawings:

- Legends of the symbols on all individual drawings
- Manual switching arrangements for light fittings in individual rooms
- An indication of the layout of the lighting and socket circuits
- The sizes of all MCB boards and sub-main cables
- The locations of the boiler flues
- Pipes sizes of the various heating circuits and of the HWS & CWS

The following drawings as outlined in the appendices to Section 2.6 shall also be included:

- Drawings to not less than 1:100 scale indicating the heating services, hot and cold water, ventilation services, soil and waste services (above ground), lighting and general electrical services including ICT. The proposed ceiling finishes shall be indicated by way of a symbol on each room and an explanatory legend on all layout drawings. Equipment positions and associated services routes shall be indicated. Primary services distribution sizes should be detailed.
- Sections (2 minimum) to 1:50 scale (through the full building) in the most heavily serviced areas. These sections should include all of the M&E services distributions i.e. both primary and secondary and all equipment relative to the areas indicated, along with the ceiling tile type, service ducts and access to same. The interaction between the building form, the structure and the services must be clearly shown
- Schematic layouts including controls for the heating, hot and cold water, gas, main power distribution and ventilation services including ventilation fans and ducts from fume cupboards (where applicable).
- A services distribution drawing indicating the proposed services distribution strategy/zones as developed from Stage 1

31.2 TENDER DOCUMENTS:

31.2.1 PRELIMINARIES:

The Building Services Consulting Engineer should not include Preliminaries in detailed breakdowns of M&E costs for inclusion in the Summary of Tender. He shall liaise with the Design Team Quantity Surveyor and ensure that these are addressed elsewhere in the tender documents.

31.2.2 TRIPLE E REGISTER:

The European Union Energy Efficient Public Procurement Regulations or SI No 151 2011 and all subsequent versions published that come into force after publication of this document shall apply on school projects.

These Regulations place obligations on the DoES and public bodies relating to the procurement of energy efficient products from a Triple E Register maintained by the Sustainable Energy Authority Ireland (SEAI) on all school projects.
The aim of the register is to assist in the reduction of carbon footprints through investing in energy efficient equipment.
Where applicable the Building Services Consulting Engineer shall ensure that all products or equipment included in mechanical and electrical tender documentations and installed in schools are listed on the Sustainable Energy Authority Ireland's (SEAI) Triple E lists of energy efficient equipment or are compatible with the criteria of the Triple E evaluation scheme.

31.3 M&E ELEMENT OF TENDER REPORTS:

The Building Services Consulting Engineer shall liaise with the other members of the Design Team to ensure a satisfactory outcome to the overall tender review and recommendation.

A copy of the M&E elements of the tender should be referred to the Building Services Consulting Engineer at an early stage in the tender review process to allow review and reporting on all relevant matters.

The report should include the following:

- Comments on:

  (i) How the M&E tender costs compare with the original approved budget figures

  (ii) How the costs of the individual National Standard Building Elements making up the tender compare with the original estimated costs

  (iii) How the M&E tender costs compare with current M&E costs on similar type projects

- Identify any shortcomings in costs which may result in compromises in both the quality of materials and workmanship and comment on these. Where there are issues to be addressed he shall liaise with the other members of the Design Team and ensure that these are followed up and clarified with the contractor as a matter of urgency and before completion of the tender report. Any element of the M&E tendered costs considered to be very low should be brought to the attention of the contractor and explanations obtained. The contractor should be given the opportunity to stand over his tender, or, if he is unable to do so, withdraw his tender.

- Where a contractor is prepared to stand over his M&E tender costs he should be requested to confirm in writing that all M&E works as detailed in the tender documents have been included and allowed for in the tender. In such circumstances particular vigilance by the Building Services Consulting Engineer during the construction stage will be required to ensure that the works are completed in accordance with the tender documents.

Tender evaluation by the Building Services Consulting Engineer should include attendance at clarification meetings with the other members of the Design Team and post clarification meetings with the preferred bidder.

As the M&E services are carried out by domestic sub-contractors there is no requirement on the Building Services Consulting Engineer to make specific recommendations as to the acceptability of the M&E subcontracts, he is of course required to comment on the viability of the tender costs and to compare the tender costs with estimated costs.

The Building Services Consulting Engineer should forward his report to the Quantity Surveyor on the Design Team for inclusion in the overall Tender Report.

32. CAPITAL CONTRIBUTIONS:

The Building Services Consulting Engineer shall liaise with the various service providers at an early stage in the design process on the availability of a suitable electricity and/or natural gas supply for the project.

He shall agree details of these as well as the amount of any Capital Contributions associated with these and include these in subsequent stage submissions. Full details of these must be identified not later than Stage 2a.

In addition he should liaise with the other members of the Design Team and brief them on the full scope and extent of any builder's work required and ensure that these are addressed in the relevant stage submissions, in particular the Cost Plan.

Capital Contributions shall not form part of the stage Cost Plan submissions for school projects as they are not normally included in the tender documentation/Building Contract. Such contributions are normally paid directly by the Client outside the contract and are subject to separate funding by the DoES.

33. HAND OVER, TRAINING & DOCUMENTATION:

A simple DVD recording shall be made of the Contractor's formal handover talks including the training and demonstration of the M&E services and handed over to the school authorities together with a fully completed and signed Completion Record Sheet (see template in appendices.) The intention is that this would act as a future aid memoir for the school authorities.

In addition to the hard copy of the Operation & Maintenance Manual a soft copy of this shall also be handed over to the school authorities on completion of a new school or extension project.

Upon completion of the installations a certificate in accordance with Appendix A below shall be completed to verify that the systems have been demonstrated to the users and that the Operation and Maintenance Manuals have been checked and issued to the school Principal. This shall be signed and dated by the Building Services Consulting Engineers and Principal and submitted to the DoES as part of the Stage 5 Documentation.

34. APPENDIX A: COMPLETION RECORD SHEET (SEPTEMBER 2012)

Completion Record Sheet (September 2012)

School Name: **Address:**	
Project:	
	Signatures & Date
Mechanical Services comprising Heating Water Services, Ventilation, Soils & Wastes and Fire Protection Services. Tested and Operating Satisfactorily	
Electrical Services comprising of Electrical Supply, Electricity Centre, Main Distribution, Power Distribution, Lighting Services, Earthing, Communication Services, Transport Services and Protective Services. Tested and Operating Satisfactorily	
The Building Services Consulting Engineer has liaised with the Contractor and confirmed that the intruder alarm installation has been zoned to take account of the school authority's requirements for out-of-hours use of the building.	
The Building Services Consulting Engineer has liaised with the Contractor and confirmed that the school authority's requirements for operational times on the heating installation, external lighting and all time clock controlled systems have been incorporated into the M&E services controls.	
A schedule of all heating zones and all time clocks within the school detailing their purpose, location and individual operational time settings has been provided in its own section in the Operating and Maintenance Manuals.	
A commissioning certificate incorporating details of the settings provided on individual detectors on the lighting controls has been provided by the Contractor and included in the Operating & Maintenance Manuals handed over to the school.	
A DVD recording of the formal handover talks, training and demonstration of the M&E services has been provided by the Contractor and is included in the Operating and Maintenance Manuals.	

A soft copy of the Operating and Maintenance Manuals has been provided by the Contractor and is included in the Operating and Maintenance Manuals	
Operating and Maintenance Manuals have been checked for compliance and handed over by the Building Services Consulting Engineers to the school and have been fully explained.	
Two training and demonstration meetings were held in the presence of the Building Services Project Engineers, the Contractor and his M&E Contractors, the School Caretaker and the Principal and were fully briefed on the operation of all elements of the M&E services provided.	**Date meeting No 1:** **Date meeting No 2:**
A laminated wall chart has been provided explaining common operating/maintenance procedures.	
As Installed Drawings that have been verified by the Building Services Consulting Engineer detailing the layout of the M&E services have been handed over to the school in hard copy and on disc.	

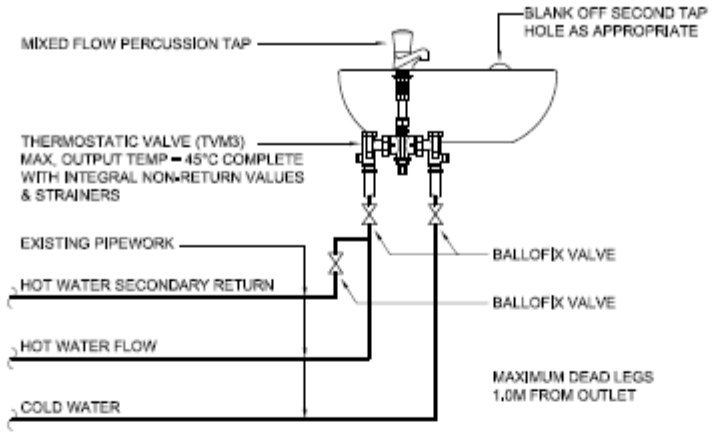
Confirmation of the above elements:

We the undersigned confirm that all of the above elements have been concluded as noted.

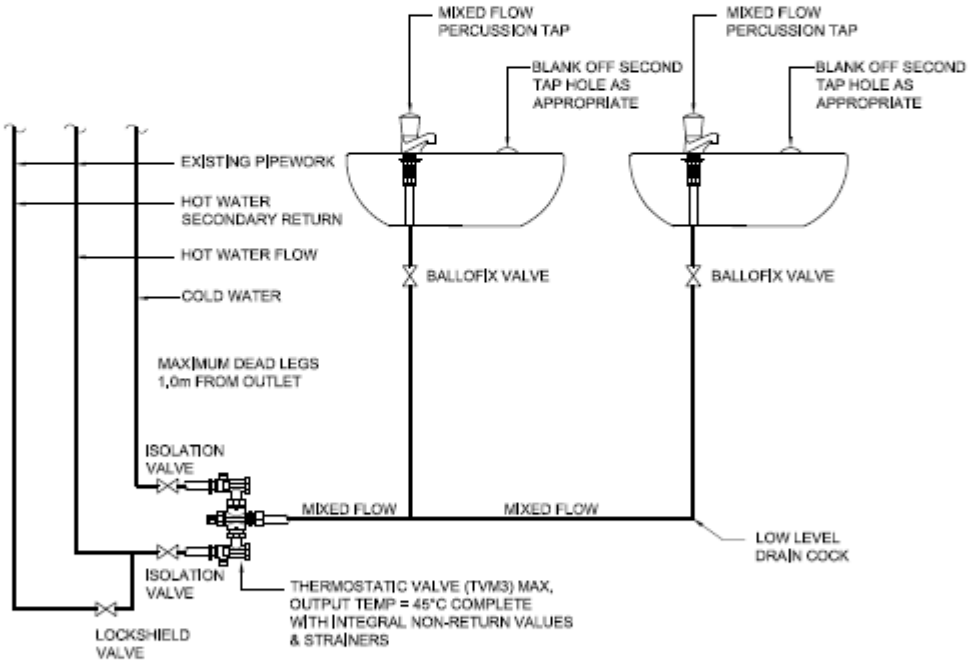
Building Services Consulting Engineers (Company Name):

Names: (printed) **(i)** **(ii)**	**Signed:**	**Date:**
School Principal		
Name: (printed)	**Signed:**	**Date:**

35. APPENDIX B: THERMOSTATIC MIXING VALVE ARRANGEMENT



TYPICAL SINGLE WASH HAND BASIN VALVE ARRANGEMENT



TYPICAL DOUBLE WASH HAND BASIN VALVE ARRANGEMENT

GENERAL NOTES:
1. NONE

TGD-032:

THERMOSTATIC MIXING VALVE INSTALLATION

AN ROINN OIDEACHAIS AGUS SCILEANNA
THE DEPARTMENT OF EDUCATION AND SKILLS
Planning and Building Unit

DRG NO:	ISSUE NO:	SCALE:	DATE:
RT-TMV-001	01	NTS	Feb 2012