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Teacher Allocations: Developing a model for Mainstream Teacher Projections

EDUCATION VOTE, DEPARTMENT OF PUBLIC EXPENDITURE & REFORM &
CENTRAL POLICY UNIT, DEPARTMENT OF EDUCATION

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Summary

- Expenditure on pay for teachers was approx.€4.5 billion in 2019 and accounts for almost 60 per cent of the total current education budget.[1] With over 50,000 mainstream teachers across close to 4,000 schools this makes allocation of teachers a complex process to model and project.
- The 2020 Spending Review paper examined the processes and mechanisms by which mainstream teaching posts, including principals, are allocated to primary and post-primary schools and how these interact with teacher allocations in the Irish Education system. The mainstream teacher allocation process goes beyond the application of an overall teacher to pupil ratio to enrolments and is based on school level enrolments. This transmission is more direct at post-primary level, with considerably more nuances at a primary level. These nuances, which seek to allow for variation in school circumstance e.g. DEIS, small school and schools with significant enrolment growth, make the projection of teacher numbers more complicated.
- This Spending Review paper uses analysis from the 2020 paper to develop a more detailed model of mainstream teacher allocations in the medium-term using school level enrolment projections to mimic the teacher allocation process.
- Enrolment projections are a key input to the model. This paper produces a number of scenarios which seek to disaggregate Department of Education School Planning Area projections to school level and uses these enrolment projections to project teacher numbers for the next 3 school years.
- This analysis models the different type of mainstream teacher post separately for both primary and post-primary level before aggregating to a total number of mainstream teachers to estimate the projected total change in mainstream primary and post-primary teaching posts over the 2022-2024 period.
- This project has demonstrated that the production of mainstream teacher number projections is complicated due to the operational mechanism of allocations examined in the 2020 paper, which allow for school circumstances including, DEIS schools, small schools, and those with a high growth rate in enrolments.
- Furthermore, the accuracy of these projections and hence the propensity to plan, both in terms of budgets and workforce planning, is dependent on highly detailed school level enrolment projections due to the process of mainstream teacher allocations in schools.

Key Findings

- Mainstream teacher numbers at primary level are expected to fall over the medium term as the demographic bubble moves from primary to post-primary level.
- Mainstream teacher numbers at post-primary level are expected to increase until 2024 in line with enrolment projections but at a falling rate.

[1] 2020 teacher pay expenditure was c.€4.7 billion, however this included additional COVID staffing supports.

The analysis has highlighted a number of areas which could improve the ability to more accurately project mainstream teacher numbers:

- At post-primary level enrolment projections are available at school level; however, at primary level they are not. The production of these should be considered.
- The analysis does not take account of the capacity limits in schools, production of school level enrolment projections which account for this could increase accuracy of the projections.
- The Department of Education Statistics Unit and Forward Planning Section (FPS) are looking at ways to refine primary school choice projections to take account of movement between School Planning Areas (SPAs) as this can be a significant issue for some areas.
- The FPS produce projections both taking account of additional residential developments and not. In the additional residential development projections migration into an SPA is taken account of while migration out of another is not, while this may be seen as appropriate in some circumstances related to provision of school places it risks an overestimation of pupils, and hence teacher numbers, when trying to project teacher allocations. For this reason the projections without additional residential development are used in this paper, however, if both movement in and out of an SPA could be taken account of the projections may be more accurate.
- The FPS has been working with the Statistics Unit to refine SPA projections. This should be continued with a view to producing a single set of near-term school-level demographic projections for the Department of Education which can be used for both the purposes of teacher allocations and capital planning. These near-term, school-level projections are complementary to the longer-term, school population projections produced by the Statistics Unit. Increased consistency between these approaches should be considered to inform longer-term workforce planning and strategic needs as pupil projections drive projected teacher numbers, longer-term workforce planning, and capital expenditure on school places.
- This paper has set up a number of scenarios for mainstream teacher projections, these should be monitored and adjusted in line with outturns to refine the projections as more information is available. The timeline for the production of projections and outturn data should be examined including:
    - The availability of medium-term, school-level enrolment projections in advance of the summer to ensure this model can be updated in advance of the Budget.
    - The availability of in-year enrolment figures, which are uploaded by schools to POD and PPOD from September, at the earliest possible date.
- At present FPS enrolment projections do not fully account for students in Special Classes at primary as the purpose of the FPS projections is to identify mainstream accommodation needs. To ensure inclusion of pupils in Special Classes, and as Special Class provision increases, the FPS projections should considered including existing Special Class enrolments as appropriate.

  The paper is also based on assumptions about staffing schedules and circulars; any changes agreed by Government to staffing allocation rules or processes should be taken into account in future updates.

1. Introduction

1.1 Introduction

Education is one of the most labour intensive services provided by the State. Teacher pay accounts for almost 60 per cent of the total current education budget.[2] At primary level enrolments have begun to decrease, while they are expected to increase at post-primary level until 2024. As the demographic bubble moves from primary to post-primary level the year-on-year changes in the allocation of teaching posts across the Irish Education sector will shift. As outlined in the 2020 Spending Review Paper on the Teacher Allocation Model the processes and mechanisms for allocations of mainstream posts in the Irish education system will complicate this shift in allocations. [3] There are asymmetries in the allocation process which will lead to a potentially slower decline in teacher numbers at primary level while post-primary teacher numbers may be expected to increase in line with demographics. While previous projections have been based on different ratios of the number of teachers to pupils the analysis in the 2020 paper indicates that a more detailed approach may be needed to better reflect demand based on the existing rules and processes.

This paper seeks to use the analysis of the 2020 Spending Review paper to develop more detailed projections of mainsteam teacher allocations, including principals. These projections will seek to move beyond the purely demographic impact on teacher numbers to look at the other operational mechanisms in how teacher allocations are determined.

- A key input to these teacher allocation forecasts are the student enrolment projections produced by the Department of Education. Currently there are different approaches to enrolment projections produced by the Department of Education reflecting their different purposes. This paper will seek to assess each and the scope for using them to develop a more detailed projection model of teacher allocations.
- Having examined the operation of policy and mechanisms by which demographics, policy and operations interact to determine teacher numbers in the 2020 Spending Review paper this paper will the seek to examine how this analysis could be used to provide more detailed projections of mainstream teacher numbers as a whole.

A report prepared the Department of Education's Statistics Section, as in input to discussions of the Teacher Supply Steering Group, 'Developing a Teacher Demand and Supply Model for Ireland 2021 –

[2] This includes the capital expenditure, of which pupil enrolments and teacher numbers are also a driver.
[3] Spending Review 2020- Teacher Allocations Model

2038', analyses future demand and supply of teacher numbers at primary and post primary level. The teacher number projections in that model were produced on a high level basis for a 15 year time period.

1.2 Methodology

The paper draws on desk-based quantitative and process analysis using a range of recently compiled and existing Department of Education administrative data including school enrolments, enrolment projections by the Department of Education and qualitative information on processes.

The staffing schedules and staffing circulars used in the projection analysis are those published by the Department of Education for the 2021/22 school year. Covid measures related to these staffing circulars are not included as they are temporary measures. These circulars are used as a basis for analysis and do not provide a budget estimate.

Notes on Terminology:

- References to year, e.g. 2020 refers to the school year which begins in September 2020
- Developing posts or projected enrolment posts, for primary and post-primary level respectively, refer to posts put in place based on the current school year enrolments in line with allocation rules. All other posts are based on the previous year's enrolments.
- FPS is the Forward Planning Section in the Department of Education which analyses demographic and enrolment trends to anticipate future demand for school places and accommodation.
- SPA refers to the School Planning Area, of which there are 314, identified by the FPS which take account not only of local groupings of schools, but also of natural boundaries, Census Small Area Population boundaries and other local conditions .[4]
- Migration Scenarios: M1 (CSO), M2(CSO) M3(CSO) refers to the CSO assumptions on migration while M1(Deperatment of Education), M2(Deperatment of Education), M3(Deperatment of Education) refers to the Department of Educations migration assumptions.
- Details of acronyms used in this paper can be seen in appendix 4.

[4] In most areas, school planning areas were based on traditional school catchment areas where all primary schools were assigned to a post-primary feeder area which was typically a population centre or town, containing one or more post-primary schools. The school planning areas were developed for use with the Department's Geographic Information System, or GIS, in 2008 and with the introduction of Small Areas in Census 2011, these areas were amended to align with Census Small Areas. The current school planning areas take account not only of local groupings of schools, but also of natural boundaries, Census Small Areas and other local conditions.

1.3 Quality Assurance (QA)

Quality assurance refers to the concepts of:

- Accuracy of data and other information presented, and
- Rigour applied in using analytical techniques and integrity in reporting.

As part of the quality assurance process feedback was sought on the analysis format (structure), clarity (quality of writing), accuracy (reliability of data), robustness (methodological rigour), and consistency (between evidence and conclusions). Further detail on the quality assurance process is set out in Appendix 1. It is important to note that involvement in the QA process does not imply agreement with the findings of the analysis.

2. Methodologies for Projecting Enrolments

2.1 Statistics Unit Projections

The Statistics Unit in the Department of Education prepare projections of full time enrolments at primary and post-primary level.[5] This section will examine how the Statistics Unit's enrolment projections are calculated.

Methodology and data

Primary level enrolments

The primary level enrolment model for 2020 is based on a CSO M1F2 female projection scenario.[6,7] The Statistics Unit then derive the future births based on CSO female projections and F1/F2 rate, and apply assumptions regarding deaths, migration and other factors that alter this base assumption:

- CSO M1F2 deaths were used, where 0 – 11 year old deaths are subtracted from the model at each class level. Deaths for 0 – 4 year olds were subtracted from Junior Infant entrants from 2023 onwards.

[5] In 2019 a regional breakdown of school level projections were prepared by the Unit rather than updated projections. Due to the multiple factors affecting the current changing landscape of school level projections, the Statistics Unit updated the enrolment projections in 2020 and plan to update the projections again in 2021.
[6] https://www.cso.ie/en/releasesandpublications/ep/p-plfp/populationandlabourforceprojections2017-2051/
[7] This scenario assumes a net inward migration of 30,000 (M1) and a declining total fertility rate from 1.8 to 1.6 in by 2031 (F2).

- The Department of Education's own migration assumptions were then added to each class level where: M1 is +1,800 (this is the POD average); M2 is +300, +600 or + 900; and M3 is 0 (this is to account for the impact of COVID-19).[8] M1 is the Department of Education's assumed central scenario.
- The other factors that alter the baseline scenario are adjustments for the percentage of ECCE enrolments, transfers to and from private (non-recognised) primary schools, repeats by class level and splitting enrolments between mainstream and special education (special education is projected in the model to increase from 2.67% to 3% in 2024 and hold steady thereafter). [9]

All these factors are taken into account to firstly project the 2020 Junior Infant intake and enrolments are rolled forward using a cohort component approach (i.e. accounting for deaths and migration) for future class years (details in Appendix 2). Each class level projection and the special education projections are summed to get total projected enrolments each year out to 2038.

Post-primary level enrolments

The primary level projection results are used as an input to the post-primary level enrolments. Factors such as repeats, flow in of enrolments, flow out of enrolments and progression rates onto Transition Year or Leaving Certificate are then included in the model to reach the post-primary projections (full details in Appendix 2). [10]

A diagram of provided by the Statistics Unit of the enrolment projection model 2020 – 2038 can be seen in Appendix 2.

[8] M1 is the current migration scenario used. In practice, this means +1800 pupils are to enter primary level every year. The distribution per class level in every year would be Junior Infants +280 and Senior Infants - 6th Class +217 in each class level. In total this is 280+(217*7)=1800 pupils per year until 2038.

[9] ECCE is the Early Childhood Care and Education Scheme and children can start ECCE if they are 2 years and 8 months of age before the 1st of September and can continue until they transfer to primary school. The introduction of ECCE has effect on projections as it is altering parent's decisions on when to send children to their first year of primary school. For example, from 2016 a second ECCE year was introduced for preschool children and this resulted in a decrease in the number of 4 year old enrolment.

[10] Migration is calculated for post-primary projections by using the average inflow 2017 – 2019 (M1). M2 is half of M1 and M3 is 25% of M1.

Changes in 2020 projections methodology

The national level projections prepared by the Statistics Unit in 2020 contains several methodological changes compared to the previous iteration of the projections that were prepared in 2018. Mainly, the M2F2 was the most likely scenario in the 2018 projections report while the M1F2 is the most likely scenario in the 2020 iteration of the projection report.[11] The methodological changes have resulted in higher projected enrolments than projected in the 2018 exercise. The changes can be summarised as follows:

- The CSO projected females assumes high net inward migration (+30,000) meaning more women of child-bearing age and more births;
- The low migration scenario (for primary pupils) has now been set to zero; the medium migration scenario (for pupils) has been reduced for the first two years of the model to 300 and 600 and then held at 900; this compares with 1,200 in 2018 model. The high migration scenario remains at 1,800 per year; this is the central scenario in the projections;
- Post-primary inflows, mainly immigration, are now set as a fixed number (average of the previous three years), rather than an 'inflow rate'. The average inflow 2017-2019 is used as M1, half this amount is used for M2 and 25 per cent of this is used for M3. Migration has increased generally in recent years; and
- The percentage of pupils with special education needs within the primary sector has been increasing over recent years. For the 2020 report this increase is continued up to 2024 and then held steady, whereas in previous iterations of the projections the percentage in the most recent year was held steady at the most recent level. This meants that as demography was decreasing the projected enrolment of this cohort was decreasing as well while the data showed that it was not the case, hence, the model needed adjustments. This shift in proportionality of pupils with special education needs will not impact on the overall number of pupils at a national level for mainstream teacher allocations.

[11] M2F2 is also discussed in the 2020 report as a potential scenario if migration softens over the coming years.

Comparing projections with outturns

Table 1 below shows the comparison of 2018 projections with 2018, 2019 and 2020 enrolment outturns. The 2018 projections were the previous projections prepared by the Statistics Unit. These projections were based on M2F2 as the most likely scenario, as discussed above.

Table 1: Projections in 2018 versus Outturns

Year	Education level	Most likely scenario (M2F2) in 2018	Actual enrolment	Difference	Per cent error
2018	Primary Level	567,819	567,772	47	0.01%
	Post Primary Level	363,495	362,899	596	0.16%
2019	Primary Level	566,220	567,716	-1,496	0.26%
	Post Primary Level	369,673	371,450	-1,777	0.48%
2020	Primary Level	559,822	561,411	-1,589	0.28%
	Post Primary Level	377,118	379,184	-2,066	0.54%

Source: Department of Education Statistics Unit projections and enrolment outturns

One of the reasons for differences in the 2018 projections was due to a slightly lower outward migration of 0 – 4 year olds than projected. There was also an increase in the number of children participating in the ECCE scheme, leading to fall in the enrolment rate of 4 year olds in school. There was an under projection at both school levels for the 2019 projections. An increase in the number of pupils choosing to do Transition Year influenced this under projection.[12] The 2020 projections were also under projected at primary and post-primary level.

[12] The percentage of pupils choosing to do Transition Year has increased from 67% in 2016/17 to 70% in 2019/20.

2.2 Forward Planning Section Projections

In its role in the planning of future school building projects the Forward Planning Section in the Department of Education carry out a demographic exercise to analyse demographic enrolment and other relevant trends in order to ensure sufficient school places and accommodation for expected future demand at a local level.[13,14] These projections will be explored in this section of the paper in the context of how they could be used to inform teacher number forecasts and workforce planning in the sector.

Methodology and Data

The demographic projections carried out by the FPS are at the school planning area (SPA) level, of which there are 314.[15] Projections conducted at this level have the benefit of being able to capture local and regional trends.[16]

The methodology set out below is that used for the 2018 and 2020 FPS demographic exercises. A new methodology is being developed by FPS for school building planning for use in 2021.

The FPS utilise data from a number of sources for the 2018 and 2020 projections:

- Data on the current student population in the SPA, i.e. the number of students enrolled in schools in the area, is taken from the Department of Education's Primary/Post-Primary Online Databases which capture information on enrolment by year, and class. This provides an accurate source of data on the number of children currently progressing through the education system in each of the SPAs.
- In order to project demand in future years the FPS use geocoded Child Benefit data to ascertain the number of children aged up to 5 years living in each of the School Planning Areas. This provides the basis for projecting primary enrolments forward by up to five years.
- Information supplied by local authorities on Additional Residential Development (ARD). This is with a view to anticipating the school place demand that may arise from significant housing provision in an area. Two sets of enrolment projections are produced one incorporating local authority additional residential development and one not.

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[13] Department of Education- Planning and Building Unit

[14] The FPS carried out this demographic exercise in June 2020 which included projections for primary level up to 2025 and for post-primary level up to 2027. Demogrpahic Projections will be produced annually using updated data.

[15] The size of SPAs ranges from 1 school to 47 schools at primary level and 1 school to 15 schools at post-primary.

[16] In assessing future school accomodation demands the Planning and Building Unit considers adjacent school planning areas, particularly at post-primary level in urban areas.

Primary

Enrolment projections at primary level were calculated by rolling the current enrolment by standard forward, year on year, and adding the projected Junior Infant intake in each year. The projection of the Junior Infant intake relies, in the first instance, on Child Benefit data for 0-5 year olds registered with addresses in the relevant SPA. Junior Infant projections are calibrated against the intake pattern in each SPA. The intake pattern is the average percentage pupil intake of schools in the area over the preceding three years, where 100% intake represents all children resident in a given SPA attending a school in that SPA. Factors such as school choice, location, and accessibility for parents in terms of work etc., impacts schools choice and not all children attend a school within the SPA in which they reside. This intake pattern at primary level broadly accounts for those children who enrol in non-mainstream primary school classes (i.e. Special Schools, Special Classes in mainstream schools and fee-charging primary schools) and for different starting ages. Appling this intake pattern to projections is therefore a useful step in terms of accounting for these factors.[17]

Post-primary

Enrolment projections at post-primary level were predicted on the numbers of students at each class year at primary level. These were rolled forward, as the basis for anticipating future years' first year intake at post-primary level. Similar to the primary projections method an intake pattern was applied in the 2018 exercise, based on historic transfer patterns from primary schools in an SPA to post-primary schools in that SPA. In 2020, projections were instead done at a school level, with historic transfer patterns from each primary school to each post-primary school used as the basis to project first year intake at each post-primary school.[18]

In the 2018 and 2020 iterations of this demographic exercise the FPS has produced additional projections which included data based on the number of new residential developments due to take place in the School Planning Area to capture any potential influx of children residential development may result in. In 2018, data were requested from local authorities housing developments of over 100 units, which have been delivered in the 18 months prior to the projections being carried out, housing

[17] In a number of school planning areas, particularly in parts of Dublin, the presence of fee-charging schools may disproportionately distort average intake patterns. A proportional adjustment is calculated for such areas to correct for the significantly broader intake of pupils that may be coming from outside of the school planning area to avail of fee-charging schools.

[18] However, these school level post-primary projections were prepared with the view of aggregating up to school planning area level. As a result, projections may not be as accurate at school level. School level projections for 2020 were 1% higher than actual enrolments when compared at an aggregated level while a difference of 7% was observed when compared at school level.

developments under construction at the time the projections were carried out or where construction is due to commence within 18 months.[19] Housing units that were planned for delivery under the Local Infrastructure Housing Activation Fund (LIHAF) were also included in the calculations, based on their then planned delivery by 2021. For the 2020 exercise, the 100 unit threshold was removed and local authorities were requested to provide data on all current or planned residential developments. The impact that housing development will have on enrolments is difficult to accurately predict due to uncertainty around the timeline for completion of the development, whether new residential developments will result in internal migration or local displacement, or which may result in broader internal migration (i.e. families from other SPAs) which would reduce demand for school places in other areas. This reduced demand in other SPAs is not taken account of in the projections which include additional residential developments.

The impact of COVID-19 on these projections is outlined in Appendix 3.

Comparing Projections with Outturn

Comparing the projected enrolments by each SPA to the actual enrolments for years 2018/19 and 2019/20 we see that there is an absolute difference of 3 percent between the projected enrolments and the actual number of enrolments at primary level and a difference of 4.6 percent at post-primary level.[20]. Looking at the difference between the enrolments and projections when aggregated to a national level the percentage difference is less than when compared across each of the SPAs. This can be seen in table 2 below.

It is important to note that the projections used in this comparison do not included Additional Residential Development which forms part of the FPS demographic exercise for projecting future demand for school capacity. Furthermore, enrolment data includes students in Special Classes in mainstream schools while enrolments in Special Classes are outside of the scope of the FPS's demograohic exercise so are not included in the enrolment projections.

[19] Assumes that 100 units would result in a gross need for marginally over one additional classroom at primary level or 23 additional pupils at post-primary level.

[20] There may be a number of reasons for the deviation here including, alterations in ECCE attendance in the wider population, changes in special needs enrolments and external immigration.

Table 2: Difference between Enrolments and Projections (%)

Year	Education level	FPS Projection	Actual enrolment	Difference	Per cent difference for aggregated projections	Average per cent difference across SPAs
2018	Primary	549,560	559,548	-9,988	-2%	3%
	Post-Primary	362,446	372,659	-10,213	-2%	5%
2019	Primary	559,362	546,733	12,629	3%	4%
	Post-Primary	372,659	371,071	1,588	0.4%	4.2%
2020	Primary	545,498	553,003	-7,505	-1%	3%
	Post-Primary	371,247	378,724	7,477	2%	4%

Source: Department of Education FPS projections and enrolment outturns
Note: Percent error, if positive projections are higher than actual enrolments

2.3 Projections and the Teacher Allocations Process

The projections by class-cohort at national level prepared by the Statistics Unit is a very detailed and comprehensive exercise. The previous iteration of projections for 2018 and 2019 were all within a less than 0.5% percentage error when compared with outturns. Furthermore, the Statistics Unit are constantly evolving how the projections are calculated with each iteration to ensure that the most accurate projection is reached based on the current school level environment.

In order to estimate future mainstream teacher allocations, however, the projections need to be as close to individual school level as possible. The projections prepared in the 2018 projection report by the Statistics Unit were further broken out into regional projections for the 8 NUTS3 Regional Authority areas in a paper in 2019. This breakdown is at too high a level to be useful in projecting teacher allocations. The Forward Planning Section projections are more granular and provide a step closer to school level projections.

The operations outlined in the 2020 Spending Review paper highlight the relevance of school level enrolments to mainstream teacher allocations. At present there is no comprehensive school level enrolments projections produced across both primary and post-primary level. Therefore, this paper uses the FPS projections, which take account of local variation in enrolments and recent enrolment data at school level to estimate a range of scenarios of teacher allocations at primary and post-primary level. The FPS Projections used do not take account of additional residential developments, as those projections are assumed to overestimate enrolments in some SPAs as pupils are not removed from other SPAs when they are added to an SPA with a new residential development. This would risk

overestimation of enrolments and teacher numbers. The Statistics Unit and the FPS are exploring the feasibility of producing school level projections at primary level. School level post-primary projections were produced for the first time in 2020.[21] These school level projections are also examined in the analysis and input to the range.

[21] These school level post-primary projections were intended to be used aggregated up to SPA for the purposes of transitions from primary to post-primary, and not intended to be used as post primary school level projections in practice.

Box 1: Trends in Forward Planning Section Projections

Before using the Forward Planning Section projections to develop a model for teacher allocations this Box provides a brief overview of the expected trends in School Planning Areas. The projections in this box are based on the FPS's 2018 demographic exercise, a new set of projections are due to be published. In general the number of teachers will follow enrolment numbers at a local level, albeit with a lag, broad trends in timing of peaks can be useful to consider how different patterns may differ over time and across regions sub-national level. [22]

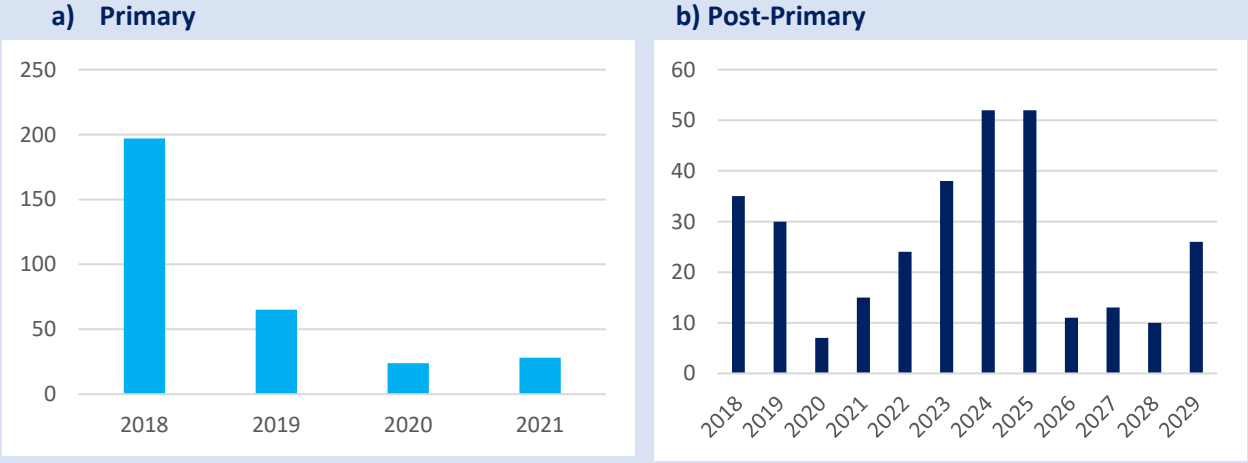
Projected Peak in Enrolments

The enrolment projections conducted at a national level by the Department of Education's Statistics Unit shows that primary level enrolments peaked in 2020, while post-primary level enrolments are expected to reach a peak in 2024 at which point they will decline.

Comparing the projections conducted by the FPS we see that when these projections are aggregated to the national level they are broadly similar to the Statistics Unit projections at post-primary level with post-primary enrolments projected to reach a peak in 2025. At primary level the FPS projections are also broadly similar to Statistics unit, with each set of projections forecasting primary enrolments continuing to fall in coming years. When looking at the projections carried out for each School Planning Area it shows that approx. 200 School Planning Areas are anticipated to reach their peak prior to 2025, while post-primary enrolments in approx. 60 School Planning Areas are anticipated to continue to increase after 2025 demonstrating different growth patterns at a sub-national level.

Figure 1: School Planning Areas by Year in which Enrolments Anticipated to Peak

Number of School Planning Areas



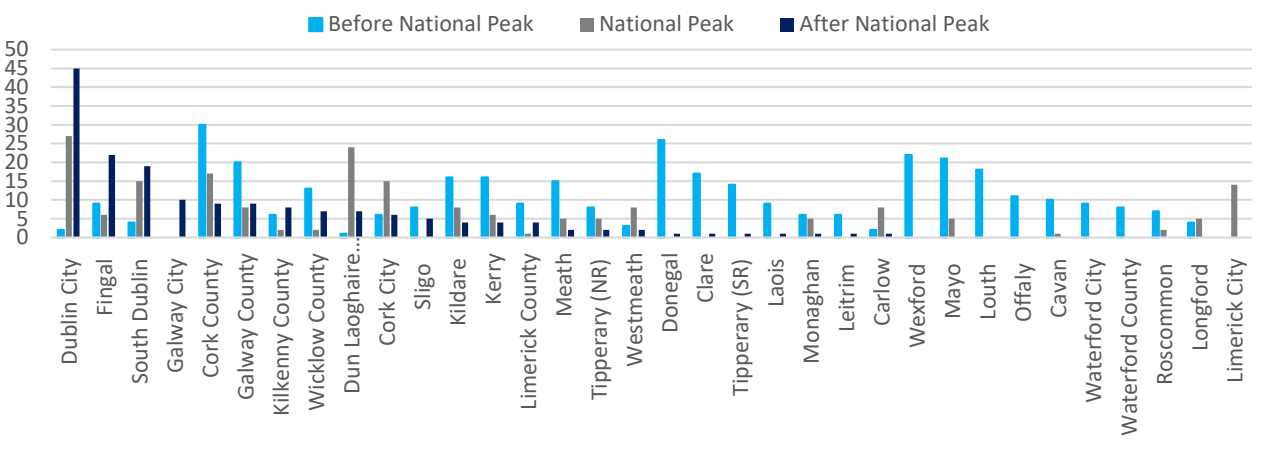
Source: Department of Education FPS projections

[22] The process of teacher allocation was examined in the 2020 Spending Review paper on the Teacher Allocation Process and the model included in this paper builds on that analysis.

Regional distribution of Projections

Looking at the projected peak year of post-primary schools by local authority area it shows that schools in urban areas and cities are expected to reach their peak enrolments after 2024, the year which Statistics Unit's forecasts project that enrolments at a national level will peak. [23] As part of the FPS's demographic excersice population trends and housing developments in regional cities and majors towns are factored in, as appropriate, to align with the National Planning Framework.[24]

Figure 2: Post Primary Schools in Local Authority Areas by when Enrolments are projected to peak
Number of Schools



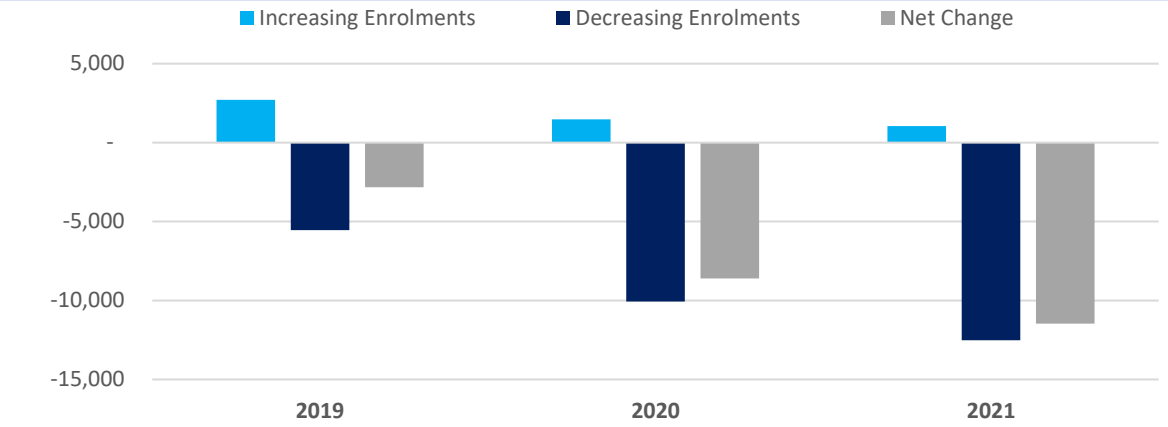
Source: Department of Education FPS projections

Expected Annual Change in Projections

In the 2020 Spending Review paper it was found that the mainstream teacher allocations process operates on a somewhat asymmetric basis with allocations based on the previous year's enrolments in most cases and provision in place for schools to gain an additional teacher where in-year enrolments increase by a certain amount. In contrast, where enrolments decrease the school's allocation will not be reduced in that year, resulting in a system where increased enrolments will see an in-year increase in the required number of teachers but a fall enrolments will not result in an in-year fall in teachers. The importance of this to the teacher allocation process is captured in the figures below which shows the projected increase in enrolments in SPAs where enrolments are projected to increase, and decrease in enrolments in areas where the projected enrolments are projected to fall as well as the resulting net change.

At primary level we see that in each of the three years included in the analysis total enrolments are projected to fall at an increasing rate. However, in each of these three years we see that in SPAs where enrolments are projected to continue to rise there will be an increase of over 1,000 pupils in each of these three years.

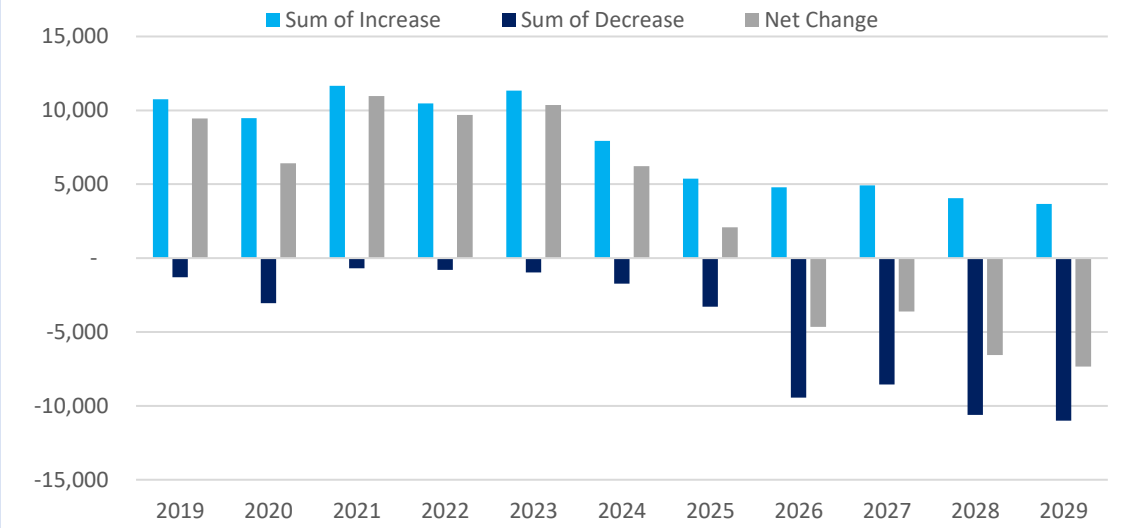
Figure 3: Projected Annual Change in Primary Enrolments, 2019- 2021
Enrolments



Source: Department of Education FPS projections

This is further pronounced at post-primary level, where we see that in the years following the projected national peak in enrolments in 2025 the SPAs that are projected to see continued increasing enrolments will see an annual increase of approx. 5,000 enrolments a year despite an overall net decrease in enrolments.

Figure 4: Projected Annual Change in Post-Primary Enrolments, 2019- 2029
Enrolments



Source: Department of Education FPS projections

[23] This pattern is expected to change in the projections currently being developed by the FPS. This is due to an updated assumption that new housing has a less immediate impact on post-primary school place requirements.
[24] National Investment Office, Department of Public Expenditure and Reform, 2021, Assessing the alignment of the National Planning Framework and National Development Plan, Analytical note for review of National Development Plan.

3. Proposed Methodology for Mainstream Teacher Projections

3.1 Outline of methodology

The Forward Planning Section projections by School Planning Area were used to project mainstream teaching posts by school. Historical school enrolments provided by the Statistics Unit in the Department of Education were used in the modelling to determine the share of enrolments in an SPA that each school represents. The aim of the exercise is to develop a methodology to project enrolment at a school level in order to accurately project teacher numbers. The modelling was carried out separately for primary and post-primary schools to reflect the different teacher allocation methods.

The starting point for the modelling was the projections for each of the 314 School Planning areas and aligning it with outturn school level data to project enrolment for each school. At primary level, the sum of enrolment in Special Classes in each School Planning Area for 2020/21 was added into each School Planning Area primary level projection. This is done because at present FPS enrolment projections do not fully account for students in Special Classes. [25]

The trend in the proportion of pupils in each school planning area attending each school within that planning area over the previous 5 years was taken.[26]

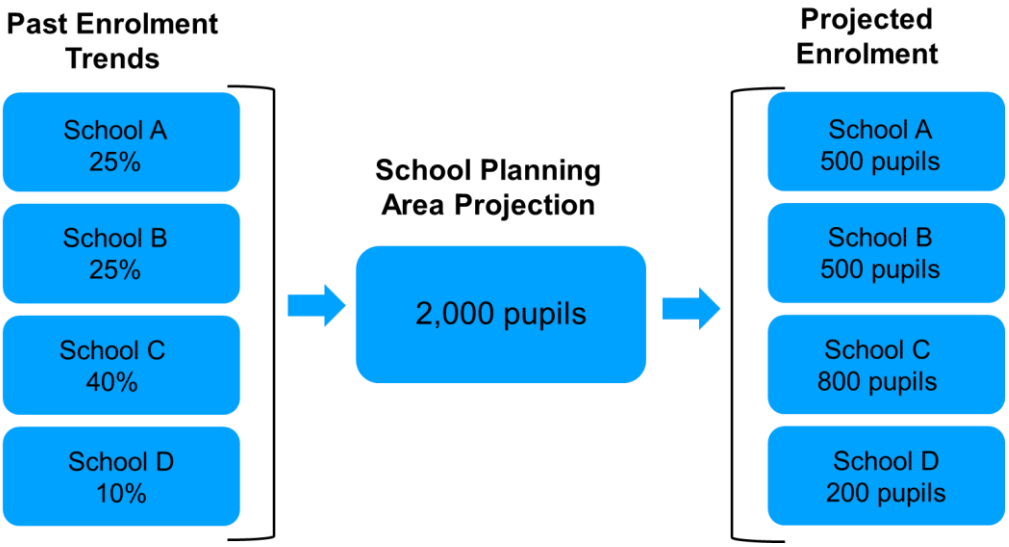
The estimated proportion for each school was then multiplied by the projected School Planning Area enrolment, and rounded, to get the projected number of students per school. An example of how this process was carried out can be seen in Figure 5 below. [27]

[25] This may lead to some element of double counting.

[26] However, if a school had opened or amalgamated within previous 5 years, the trend in the proportion of pupils attending these schools was taken only for the years that these schools were open. This is because the trend in the distribution of pupils attending these schools would be skewed by the fact there was no enrolment in these schools for a number of the years.

[27] Primary enrolments were rounded up to the nearest pupil; with post-primary enrolments rounded to nearest pupil. Based on a calibration exercise that modelled past projections and compared to outturn teaching posts these gave the closest results for each model. This is supported by the different mechanisms of mainstream teacher allocation within each school level.

Figure 5: School Planning Area school level projections example



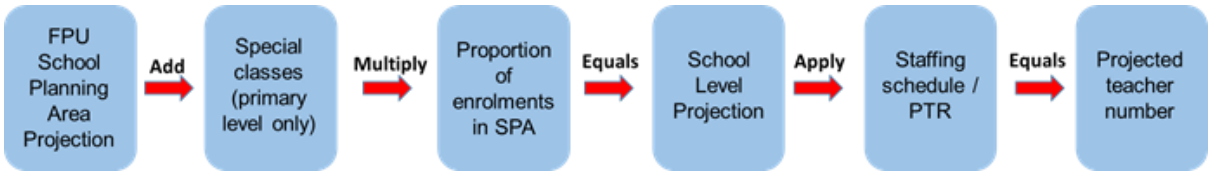
In Figure 5, an example school planning area with four schools (A – D) can be seen. By applying a trend to historical enrolment proportions for the previous 5 years, it is estimated that School A will account for 25% of the total enrolment in the School Planning Area for the upcoming academic year. School B will account for 25%, School C will account for 40% and School D will account for 10% - summing up to a total of 100%. This example school planning area is projected to have 2,000 pupils in the upcoming academic year. Each school's estimated proportion is multiplied by 2,000 pupils to arrive at projected school level enrolment. For example, 25% multiplied by 2,000 pupils results in 500 pupils projected for School A. The sum of the projected school level enrolments in the school planning area is 2,000 pupils.

At primary level, the staffing schedule (i.e. the thresholds for attaining an additional teacher) was then applied to these school level projections to get a total number of mainstream primary teachers. The projected school level growth is used to calculate the number of developing posts and appeals posts are assumed flat at 90 posts in line with the analysis from the 2020 Spending Review paper. The staffing schedule applied was based on the 2021/22 schedule.[28] [29]

At post-primary level, the various PTRs set out in the staffing circulars were applied to the school level projections to get a total number of mainstream post-primary teachers. The PTR were applied based on the PTRS for the 2021/22 school year, excluding temporary posts related to public health advice for the 2020/21 school year.

[28] https://www.education.ie/en/Circulars-and-Forms/Active-Circulars/cl0019_2021.pdf
[29] For the school year 2022 onwards, the schedule was amended to reflect to previous rules for the retention of posts as the changes applied to retention posts in the 2021 academic year are temporary Covid measures.

Figure 6: Overview of modelling process



Other methods of deriving school level projections from School Planning Area projections.

The model was also carried out using an average proportion in each school planning area over the previous 5 years and also using the proportions within each School Planning Area for 2020/21, the most recent year of outturn data. However, using the trend in proportions is deemed the most accurate method from a comparison of outturn posts to the application of this model to past School Planning Area projections. [30]

Post-Primary School Level Projections

As outlined previously in the paper enrolment projections are also carried out at school level at post-primary level. In addition to the methodology described above this paper also projects teacher numbers using these school level enrolment projects. Similarly to the methodology described above in order to estimate the resulting post-primary teaching numbers the PTRs are applied to pupil enrolments. These PTRs are outlined for various post-primary posts as set out in the relevant circulars published annually and are described in the Spending Review paper, *Teacher Allocation Model*, published in 2020. [31] These projections assume no policy change and do not take into account the reduced PTR for additional staff to support schools in the context of Covid-19 as this change is temporary in nature.

3.2 Limitations

There are a number of limitations to this analysis including;

- The analysis has made certain assumptions regarding the pattern of school attendance in an SPA on the basis of past trends. These patterns may vary overtime, in part due to parental choice of schools, and thus this assumption may not be accurate.

[30] An insample projection was produced and the trend produced the lowest error and is therefore assumed as the most accurate, however this will be reviewed over time as actual outturns are known.
[31] Post-Primary Teacher Allocations Circulars

- The post-primary projections at school level are based on previous transfer patterns, because of this where new schools are opened the past trends are less reliable.
- The analysis outlined above does not take account of the capacity limits in schools, therefore in some schools the capacity may not be available to intake the new enrolments assumed.
- The modelling allocation of pupils to schools is done from SPA level. Where pupils are living in one SPA it is not clear if they will attend a school in that area or another area.
- At present FPS enrolment projections do not fully account for students in Special Classes at primary as the purpose of the FPS projections is to identify mainstream accommodation needs. Pupils in Special Classes have been added into the school-level projections for the purposes of this paper as they are included in enrolment numbers for the purposes of mainstream teacher allocations. Enrolment in Special Classes in 2020/21 was assumed to be held constant in the modelling.

3.3 Projections

Primary Projections

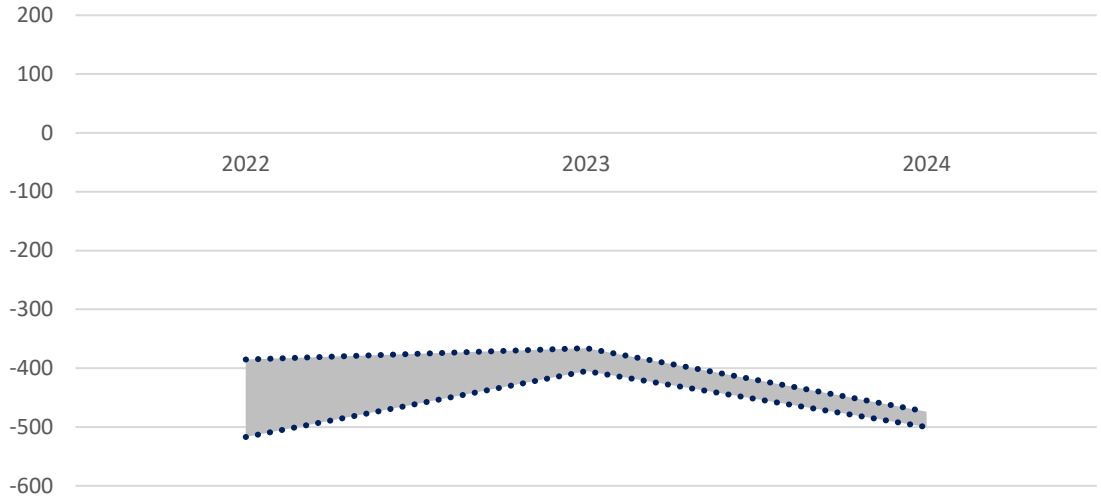
Table 3 below shows projected primary teacher numbers using the methodology outlined in Section 3.1. It can be seen that using a trend in proportion of enrolment, an average in proportion of enrolments or the previous year proportion enrolment, results in broadly similar projections. However, using the trend in proportions is deemed the most accurate method from a comparison of outturn posts to the application of this model to past SPA projections. Primary teacher numbers are projected to increase from 2020 to 2021 due to policy changes for the 2021 academic year. These changes were a reduction of the general average of the staffing schedules and the introduction of lower retention thresholds for all schools. According to the methodologies below mainstream primary teacher numbers will then, in the absence of policy change, begin to fall. This reflects enrolments projections which show that enrolments at primary level peaked in 2018.

Table 3: Additional Mainstream Primary Teaching Posts based on Projections, 2022- 2024
Year-on-year Change in Number of Teaching Posts

	2022	2023	2024
Enrolment Trends in School Planning Area applied	-397	-366	-498
Average proportion in SPA applied	-517	-394	-474
2020 enrolment proportion within SPA applied	-385	-405	-500

Source: Department of Education Enrolment Data, Forward Planning Section enrolment projections and authors calculations.
Note: Base year 2021 teacher number projections. Different modelling methods are applied to get from School Planning Area projections to school level estimates.

Figure 7: Projected year-on-year change in mainstream primary posts



Source: Department of Education Enrolment Data, Forward Planning Section enrolment projections and authors calculations.
Note: Base year 2021 teacher number projections

Post-Primary Projections

As outlined in table 4 below across the three methodologies which estimates the distribution of enrolments at SPA level in each school in the SPA using the trend in the distribution of enrolments, the average share of enrolments a school represents, and by holding the proportion of enrolments in a school at the proportion of enrolments that the school had in 2020 are broadly similar. According to these methodologies post-primary teacher numbers will continue to grow until 2024. This reflects enrolments projections which show that enrolments at post-primary level are expected to increase up to 2024, at which point they will begin to decline.

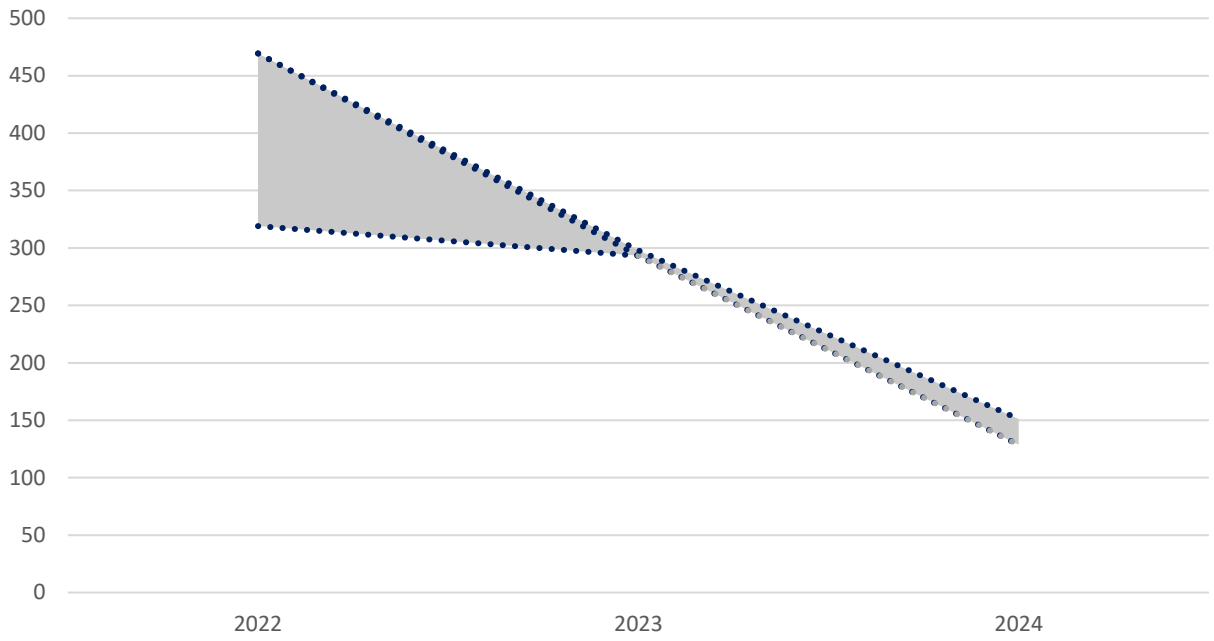
Projections using school level projections suggest that post-primary teacher posts will continue to increase up to 2024.

Table 4: Additional Post-Primary Mainstream Teaching Posts based on Projections, 2022- 2024
Year-on Year Change in Number of Mainstream Teaching Posts

	2022	2023	2024
Enrolment Trends in SPA applied	319	296	151
Average proportion in SPA applied	448	298	150
2020 enrolment proportion within SPA applied	328	298	150
School Level	469	293	129

Source: Department of Education Enrolment Data, Forward Planning Section enrolment projections and authors calculations.
Note: Base year 2021 teacher number projections. Different modelling methods are applied to get from School Planning Area projections to school level estimates.

Figure 8: Projected year-on-year change in mainstream post-primary posts



Source: Department of Education Enrolment Data, Forward Planning Section enrolment projections and authors calculations.
Note: Base year 2021 teacher number projections. Different modelling methods are applied to get from School Planning Area projections to school level estimates.

4. Conclusions

The teacher allocation process in the Irish Education System is complex due to the scale ,diversity and operations of the system, this is particularly true at primary level. This process is based on school level enrolments and was examined in the 2020 Spending Review Paper on the Teacher Allocation Model. This second Spending Review paper sought to use that analysis to develop a detailed model to project mainstream teacher allocations in the medium term using school level enrolment projections to mimic the teacher allocation process.

Enrolment projections are a key input to the model. The paper examined two sets of enrolment projections produced by the Department of Education including the Statistics Unit national level enrolment projections and the Forward Planning Section School Planning Area level enrolments —which have been appended with school level projections at post-primary projections this year. The paper produced a number of scenarios which seek to disaggregate these school planning area projections to school level and use these enrolment projections, and the published staffing schedules and circulars for mainstream teacher allocations, to project mainstream teacher numbers for the next three school years.

This analysis models the different type of teacher post separately for both primary and post-primary level before aggregating to a total number of teachers to assess the total change in mainstream primary and post-primary teachers over the 2022-2024 period. The analysis shows:

- Mainstream teacher numbers at primary level are expected to fall over the medium term as the demographic bubble moves from primary to post-primary level.
- Mainstream teacher numbers at post-primary level are expected to increase until 2024 in line with enrolment projections but at a falling rate.

This project has demonstrated that the production of mainstream teacher number projections is highly complicated due to the operational mechanism of allocations. Furthermore, the accuracy of these projections and hence the propensity to plan, both in terms of budgets and workforce planning, is dependent on highly detailed school level enrolment projections due to the process of teacher allocations to schools. The analysis has highlighted a number of areas which could improve the ability to more accurately project teacher numbers:

- At post-primary level enrolment projections are available at school level; however, at primary level they are not. The production of these should be considered.
- The analysis outlined above does not take account of the capacity limits in schools, production of school level enrolment projections which account for this could increase accuracy of the projections.
- The Statistics Unit and Forward Planning Section are looking at ways to refine primary school choice projections to take account of movement between SPAs as this can be a significant issue for some areas.
- In the Forward Planning Section's additional residential development projections migration into a school planning area is taken account of while migration out of another is not, while this may be seen as appropriate in some circumstances related to capital accomocation it risks an overestimation of pupil and hence teacher numbers when trying to project teacher allocations. For this reasons the projections without additional residential development are used in this paper, however, if both movement in and out of an SPA could be taken account of the projections may be more accurate as residential development can have a significant impact on enrolments at a local level.
- The Forward Planning Section has been working with the Statistics Unit to refine School Planning Area projections. The Department of Education should continue exploring this work with a view to producing a single set of near-term school-level demographic projections for the Department which can be used for both the purposes of teacher allocations and capital

planning. These near-term, school-level projections are complementary to the longer-term, school population projections produced by the Statistics Unit. Consistency between these approaches should be considered to inform longer-term workforce planning and strategic needs as pupil projections drive projected teacher numbers, longer-term workforce planning, and capital expenditure on additional and replacement school places.

- This paper has set up a number of scenarios for teacher projections, these should be monitored and adjusted in line with outturns to refine the projections as more information is available. The timeline for the production of projections and outturn data should be examined including:
    - The availability of near-term, school-level enrolment projections in advance of the summer to ensure this model can be updated in advance of the Budget.
    - The availability of in-year enrolment figures, which is uploaded by schools to POD and PPOD from September, at the earliest possible date.
- At present FPS enrolment projections do not fully account for students in Special Classes at primary as the purpose of the FPS projections is to identify mainstream provision needs. To ensure inclusion of pupils in Special Classes, and as Special Class provision increases, the FPS projections should considered including Special Class enrolments as appropriate.
- The paper is also based on assumptions about staffing schedules and processes; any changes agreed by Government to staffing allocation rules or process should be taken into account in future updates.

5. Appendix 1: Quality Assurance Process

Quality Assurance Process

To ensure accuracy and methodological rigour, the author engaged in the following quality assurance process.

✓ Internal/Departmental

- ✓ Line management
- ✓ Spending Review Sub-group and Steering group
- ✓ Other divisions/sections
- ✓ Peer review (IGEES network, seminars, conferences etc.)

✓ External

- ✓ Other Government Department
- □ Advisory group
- □ Quality Assurance Group (QAG)
- □ Peer review (IGEES network, seminars, conferences etc.)
- □ External expert(s)

□ Other (relevant details) – INSERT

Appendix 2: Statistics Unit Enrolment Projections Calculation

Primary Level Enrolment Projections

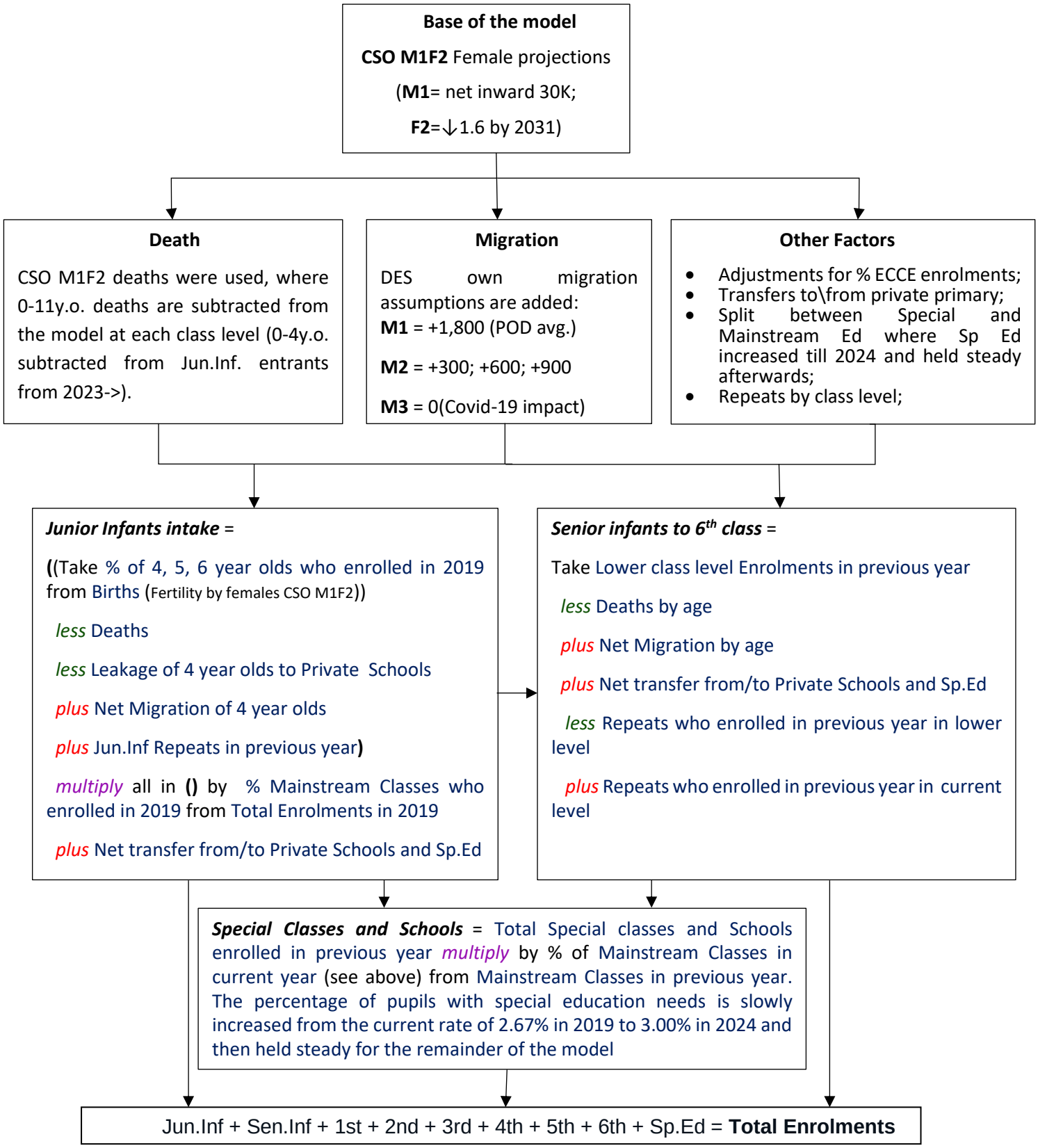
For Junior Infant level, actual births are used up to 2024 and projected births using the CSO M1F2 scenario are used thereafter. The percentage of 4 – 6 year olds who enrolled in 2019 are taken from births. Deaths and leakage of 4 year olds to private schools are then subtracted from the remaining births. Net migration of 4 year olds and Junior Infant repeats from the previous year are then added. The number that is left is multiplied by the percentage of mainstream classes enrolled in 2019 from total enrolments in 2019, to get the number that can be attributed to mainstream classes. Finally, net transfers from private schools and special education that occur during the academic year are added into mainstream enrolemnts. The remainder are special education enrolments..

To calculate projections for Senior Infant to 6th class, the model firstly takes the class level below enrolment from the previous year.[32] Deaths by age and repeats who enrolled in the previous year in the lower level are then subtracted. Net migration by age, repeats who enrolled in the previous year in the current class level and net transfers from/to private schools and special education are then added. This yields the projected enrolment by class level.

Each class level projection and the special education projections are summed to get total projected enrolments each year out to 2038.

[32] For example, to project 6th class enrolment for 2021 the model will use 5th class enrolment from 2020.

Diagram of the Statistics Unit's primary enrolment projection model 2020 – 2038



Post-Primary Level Enrolment Projections

For Junior Cycle levels 1 – 3 projections, the class level below enrolments from the previous year are taken and flow in enrolments are added while flow out enrolments are subtracted. Flow in enrolments take into account immigration (including from Northern Ireland), students moving from home schooling into the school system and students moving from non-recognised schools to recognised schools. Flow out enrolments take into account year on year outflow rates based on the latest retention data, such as schools leavers and emigration.[33] The flow in and flow out enrolments are calculated for each class group i.e. to project JC3 the flow out enrolment will take into account school leaves in JC3. Finally, repeats who enrolled in the previous year in the current class level are then added and repeats who enrolled in the previous year in the lower class level are subtracted.

For Transition Year level projections, JC3 enrolments from the previous year are taken. Flow out enrolments for Transition Year level (JC3 leavers, emigration etc.) are subtracted and repeats who enrolled in previous year JC3 are also subtracted. This number is then multiplied by the percentage progression to Transition Year level. To get the percentage progression to Transition year for 2020 projections, for example, it is number of tracked students that enrolled in Transition Year in 2019 as a percentage of total JC3 enrolments in 2018. Finally, flow in enrolments are added.

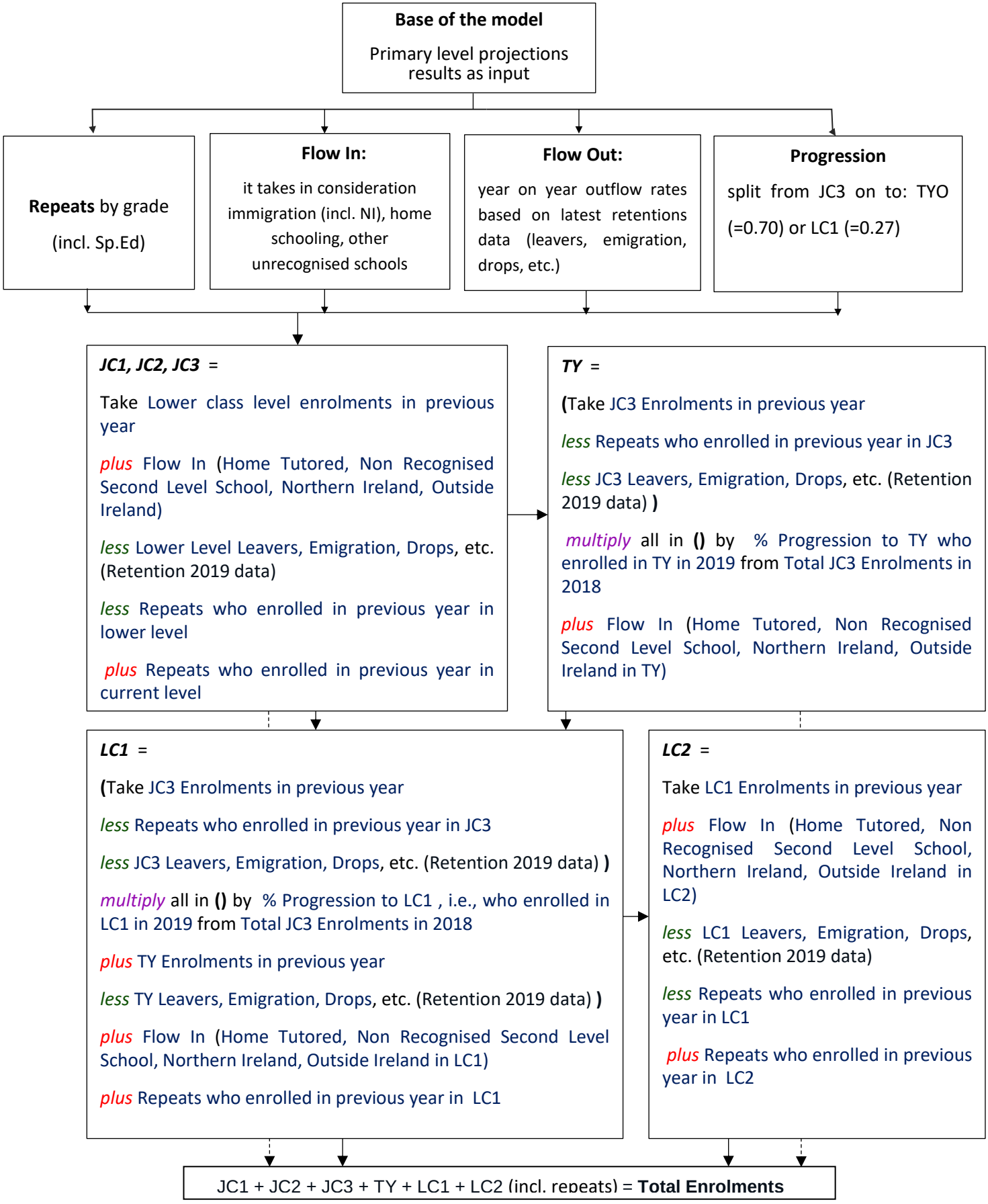
To project the first Leaving Certificate year (LC1), JC3 enrolments from the previous year are used. Flow out enrolments and repeats who enrolled in previous year JC3 are then subtracted. This is then multiplied by the percentage progression to LC1. To get the percentage progression to LC1 for 2020 projections, for example, it is the number of tracked students that enrolledin LC1 in 2019 as a percentage of total JC3 enrolments 2018. Transition Year enrolments from the previous year, flow in enrolments and repeats who enrolled in previous year LC1 are then added into the projection. Finally, flow out enrolments (Transition Year Leavers, emigration etc.) are subtracted from the projection.

LC1 enrolments from the previous year are used to project the second Leaving Certificate year (LC2) enrolments. Flow in enrolments and repeats who enrolled in previous year LC2 are added, while flow out enrolments and repeats who enrolled in previous year LC1 are subtracted, to arrive at the LC2 projection.

Projections from JC1, JC2, JC2, Transition Year, LC1 and LC2 are summed to calculate total enrolment projections.

[33] School leavers and emigration statistics are gathered by each class level. For example, the flow out enrolments for JC3 projections would include leavers to JC2 and emigrations at JC3 age.

Diagram of the Statistics Unit's post-primary enrolment projection model 2020 – 2038



Appendix 3: Impact of Covid-19 on FPS Projections

The Child Benefit data received from the Department of Social Protection is annualized to the 30 April each year and used to project Junior Infant intake five years subsequently. On that basis, for example, data on births between 1 May 2019 and 30 April 2020 is used to anticipate primary enrolments for the 2024/25 academic year. Registrations of births for February, March and April 2020 were significantly lower than typical and this is understood to be associated with Covid-19 related restrictions temporarily limiting the facility for in-person registrations and other potential behavioural factors which delayed registration activities. The projections for 2024 enrolments from the 2020 demographic exercise are expected to be underestimated for that reason. At a national level, the projections are likely to be understated by circa 6,000-7,000, however the impact on individual school planning areas appears to be inconsistent.

Schools have reported instances of parents postponing starting their children in school in September 2020, this may artificially deflate primary enrolments in 2020. However, further data would be required to assess the impact this has had.

Delivery of Additional Residential Development may have been delayed as a result of restrictions in place in 2020 and 2021. Again, further information and data would be required to quantify the impact this has had on school enrolments.

Appendix 4: List of Acronyms

Acronym	Description
POD	The Primary Online Database (POD) is a nationwide individualised database of primary school pupils, facilitating the monitoring of educational progress as pupils move through the primary education system and on to post-primary. The system allows schools to make online returns to the Department of Education and provides the Department with the comprehensive and in-depth information needed to develop and evaluate educational policy.
PPOD	The Post-Primary Online Database (P-POD) system is a central database for student and some school data which is hosted by the Department. All post-primary schools are required to make their returns of students (known as the October Returns) via P-POD. The October Returns data is used in the allocation of teaching posts and funding to schools.
PTR	Pupil Teacher Ratio
SPA	Shool Planning Areas were based on traditional school catchment areas where all primary schools were assigned to a post-primary feeder area which was typically a population centre or town, containing one or more post-primary schools. The school planning areas were developed for use with the Department's Geographic Information System, or GIS, in 2008 and with the introduction of Small Areas in Census 2011, these areas were amended to align with Census Small Areas. The current school planning areas take account not only of local groupings of schools, but also of natural boundaries, Census Small Areas and other local conditions