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National Postcode System

Design Report

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Executive Summary

This report describes the design principles and methods of validation for two key components of the National Postcode System (NPS): the postcode itself and the main vehicle for its usage, the Postcode Address Database (PAD) which cross-references postcodes and addresses including non-unique addresses. It builds on the earlier work of the National Postcodes Project Board around 2006 and subsequent studies and consultations conducted by the Department of Communications, Energy and Natural Resources (DCENR). The legal framework for the NPS is set down in the Communications Regulation (Postal Services) Act 2011.

Design Principles

The consultations referred to, informed also by the Postcode Management Licence Holder (PMLH) procurement process, set out a number of design principles, inter alia:

- The postcode should be unique for each address point – referred as "Unique Delivery Point" (UDP) - and initially at least, be used solely for identifying postal addresses.
- It should consist of a three-character Routing Key identifying the principal post towns assigned by the Universal Service Provider (USP), followed by a four-character Unique Identifier for each UDP within that area.
- Dublin postal districts should be retained but all other Routing Keys should avoid association with geographic features such as town or county names.
- The form of address used (in the PAD) should be the postal address - as determined by the USP – in Irish and English.
- The detailed design of the postcode should facilitate automated and manual sorting of post (through consultation with the USP).
- A special licenced service should manage and operate the NPS: the Postcode Management Licence Holder (PMLH).

The above principles were based on experience in implementing new or changed postcodes in other countries and on the high proportion (35%) of non-unique addresses (NUA) in Ireland. In most countries, a postcode is assigned to clusters of properties ranging in size of 10-50 properties (e.g. UK) to tens of thousands (e.g. most EU countries).

The 'non-unique address' issue arises elsewhere (albeit to a far lower extent) and was dealt with by enforcing rigid addressing standards; for example, the UK insisted that instead of using townland names, all rural roads were named and each house assigned a number. This process added greatly to timescales for adoption due to the workload involved and to cultural resistance. Trying to do so in Ireland would risk considerable delay and possible failure of postcode adoption. That idea was therefore dropped in favour of assigning a unique identifier to each property that did not necessitate changing addresses.

The PMLH team conducted further research and consulted with the USP to arrive at the detailed specification for the proposed postcode and PAD. The team then prepared plans for how the postcode and the PAD can be validated so as to protect its integrity and promote confidence amongst public, commercial and personal users.

What gets a Postcode?

All addresses in permanent structures that receive mail will be assigned a postcode and will be included in the Postcode Address Database (PAD) - these are known as a Unique Delivery Point (UDP). All UDPs and their addresses are recorded in the GeoDirectory database; they will be passed to the PMLH for inclusion in the PAD.

An important point to bear in mind in assigning postcodes for commercial premises is that postcodes relate to the property or building, not to the business itself. Within multi-unit complexes, postcodes will be assigned to each unit if they are addressed as such (e.g. Unit 20 in a shopping centre) but not to each tenant in a multi-tenancy building (e.g. an office shared by a number of businesses) but rather one postcode will be given to the building.

The GeoDirectory does sometimes record the businesses within a property as a value-added feature of its database but these are not relevant to addressing; such instances can be identified and dealt with in creating and maintaining the PAD (i.e. they will share the same postcode assigned to the building). The following are some examples of what will and will not be allocated a postcode

What gets a Postcode	What does NOT get a Postcode
Each residential property, e.g. • Each house on a street • Each flat in an apartment block • Both units in a duplex unit • Halting site	**Other types of residence**, e.g. • Mobile homes • Canal barges or houseboats • Jeanie Johnson • Caravan
Non-residential addresses, e.g. • **Office building** • Factory • Units in a Shopping Centre • Units in a Business Park or Industrial Estate • College Campus	**Ancillary buildings/locations** e.g., • Milking parlour • Sports fields • Public parks • Points of interest (e.g. Dublin Spire)

In the case of multi-unit buildings (e.g. apartments in an apartment block, units in a shopping centre), a postcode will be assigned to each UDP which is a unit which is uniquely identified within the address information (i.e. an apartment has a unique number; the shop has a unit number) by the USP. In these cases, business name alone is not considered a separate UDP, as postcodes are not assigned to individuals or businesses, but rather they are assigned to addresses.

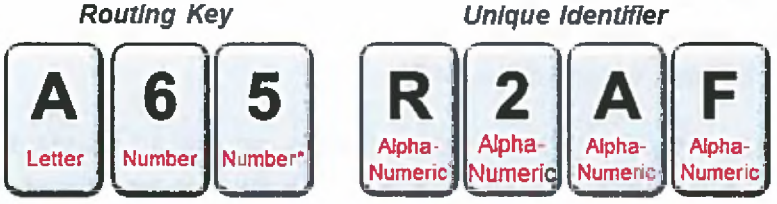
In the case of mixed use buildings (i.e. residential and non-residential UDPs), unique postcodes will be assigned for each uniquely-addressed residential UDP and each non-residential UDP (i.e. there will be a minimum of two unique postcodes in such buildings).

Postcode Design

The detailed design of the postcode firstly considered how the two segments of the postcode should be allocated. The first three-character segment ("Routing Key") is designed to support the methodology for manual sorting of mail which will bring operational and cost benefits to postal operators and improve downstream access opportunities to the USP network by third parties. Consistency in the style of the Routing Key is also important, so a style similar to that used for Dublin Routing Keys (D01, D14, etc.) is retained, i.e. other Routing Keys are in a letter-number-number style (e.g. A10, F24, etc.). While not linked directly to geographic features (i.e. towns, counties, etc.), it will provide a sense of location in a similar fashion to telephone prefix codes do, so providing a sense of geographic intuition aiding better recall.

The random/structured issue was also considered in regard to the second segment of the postcode, the "Unique Identifier". A structured form of Unique Identifier would involve linkage to geographic features (i.e. streets, townlands) and assigning house numbers. Although this style is more intuitive, it has no value in sorting mail and extensive geographic surveys are needed to create it and subsequently, in maintaining it. This type of code is also more prone to running out of capacity (i.e. resulting from growth in towns, streets, etc.) which can lead to people having to change their postcode which is very disruptive. An unstructured or random Unique Identifier is more 'future-proofed' and its setup and maintenance effort is minimal; for these reasons, a randomised Unique Identifier is recommended.

The length of the code is an important factor as regards "memorability" as this will strongly influence adoption rates. Internationally, postcodes vary in size from 4 to 10 characters; most are all numbers but some use numbers and letters (e.g. UK, Canada, and Netherlands). Shorter codes are clearly easier to remember so the main issue is to find the minimum size that can accommodate the number of Unique Identifiers within a Routing Key. At present, the largest Routing Key area has 80,000 UDPs but the average Routing Key area has 12,000 UDPs. To allow for growth, the Unique Identifier needs to be able to accommodate 350,000k Unique Identifiers per Routing Key. Doing so using numbers would lead to a nine-character code (without counting spaces). Adopting an alpha-numeric Unique Identifier would only require a four-character code, giving a total length for the postcode of seven characters. The proposed postcode layout is therefore as follows:



The letter "W" will only be allowed for postcodes in D6W.

The technical design work concentrated on four key areas affecting the postcode:

- Excluding certain letters which can cause problems for automated mail sorting equipment which uses optical character recognition (OCR) technology.
- Consideration was also given to phonetically similar letters which can be confused in verbal communication, notably in call centres.
- Choosing the letters used for the Routing Key which avoid association with local features along with some other rules with regard to the construct of the Routing Key (e.g. avoiding leading or trailing zeroes which might be omitted inadvertently)
- Avoiding offensive or otherwise sensitive words or terms (e.g. proper names, acronyms, words) within the combinations of letters and numbers.
- Avoiding possible miscommunication of postcodes by avoiding physically adjacent addresses having similar postcodes.

These are set out in Section 2 with further detailed analysis of the rationale in Appendix A.

Postcode Validation

A series of measures will be built into the systems and processes used to assign postcodes to ensure accuracy, completeness and adherence to the design principles described above. Further tests will be conducted independently of the team directly engaged in the production of postcodes.

PAD Design

The Postcode Address Database (PAD) will cross-reference postcodes to addresses and will contain one record for each unique delivery point. It will be derived from the GeoDirectory which contains all postal addresses recognised by the USP.

The PAD acts as the main vehicle for deploying postcodes into organisations, usually being embedded into systems to assist with: postcode validation, address verification and postcoding databases. When additional data is appended (e.g. geo-coordinates), the PAD can assist in areas such as: marketing analyses, anti-fraud, logistics planning and other location-based services.

The PAD will be the PMLH's primary revenue source and will be distributed mainly through value-added-resellers (VARs). The PAD which will be made available to all licence holders will contain standard address details and postcodes. The PMLH will enable the provision of enhanced services through its Value-Added Resellers (VARs) who will be provided with additional data which will contain address "aliases" and (subject to contractual agreement with data suppliers) geo-coordinates and boundary data which will be made available on a separate commercial basis to that of the PAD.

The technical design of the PAD follows internationally recognised standards adapted to the unique features of Irish addresses and the fact that there is no obligation to change or standardise addresses. The PAD design caters for supplying Irish and English versions of postal addresses and will be distributed in a technically standard and simple format (i.e. as a 'flat file') which will make it accessible to all levels of users.

After the initial development exercise – using the GeoDirectory and some large public service databases - the PAD will be updated (e.g. with new addresses) and distributed to licenced users on a regular basis by the PMLH.

PAD Validation

The design objectives for PAD Validation are:

- To ensure that every unique address is assigned its correct postcode
- To ensure completeness and accuracy of the PAD.

A series of measures have been built into the development process to achieve these goals. In addition, a number of independent validation measures will be taken in respect of the PAD. These will involve a structured sequence of validating the prime source data (i.e. the GeoDirectory) for completeness and accuracy and then reconciling the GeoDirectory and the PAD.

The following diagram illustrates the relationship between the main data sources:

The final component of the Validation exercise will independently assure the completeness and accuracy of the PAD itself, particularly in regard to how postcodes are assigned and that the various rules (described in Section 2: Postcode Design) have been fully implemented.

These validation processes may raise queries or issues that may need review or correction in the GeoDirectory. The operational procedures associated with handling queries - and other aspects of the Validation exercise - are under discussion with GeoDirectory.

PAD Pricing

Sales of the PAD are the main revenue source for the PMLH, so the pricing model must be low to encourage use of the PAD but it must also generate sufficient funds to make the PMLH self-funding.

The Pricing Model has been kept as simple as possible with options for larger users to have unlimited usage for a fixed fee and for smaller users (e.g. small businesses, voluntary bodies) paying smaller amounts related to postcode lookups that they used.

The Public will be able to easily access the PAD data for free from a dedicated web site. The cost of using the PAD data for commercial or non-commercial purposes will be the same irrespective of how the data is purchased.

The pricing is based on the indicative pricing included in the tender document and has been designed to encourage use of the data as widely as possible and in as many markets as possible. A number of companies in different markets (e.g. Internet and customer

management systems) have had the opportunity to comment on the proposed pricing. Following these meetings with companies and a study of licensing approaches in other countries, slight adjustments have been recommended.

It is recommended that a negotiation is undertaken through central procurement (OGP/CIO) to agree a non-discriminatory, annual PAD licence fee for unlimited use across named public bodies.

Conclusions

We believe that the proposed design will achieve the goals set for the project and accommodates the sortation/operational requirements of the USP. Validation programmes will provide assurance as to the accuracy and completeness of the postcodes and of the PAD.

The postcode and PAD designs are on the critical path for the overall project as they directly affect two key project milestones:

- Passing the full PAD to the USP so that they can start on the nine-month project to postcode-enable their automated sortation systems
- Releasing the postcode specifications and PAD specifications to VARs so that they can proceed with developing and refining their products and services.

Both must occur by the end June 2014 in order to achieve the overall objective of launching postcodes in April 2015.

1. Introduction

1.1 Purpose of this Document

This document sets the design of key elements of the National Postcode System namely:

- The Postcode itself (i.e. format, design considerations, derivation)
- The Postcode Address Database ("PAD") which cross-references addresses and postcodes.

It also sets out the approach and design principles that will be used to verify the completeness and accuracy of both elements.

1.2 Background to this Document

Over the past ten years, a number of study groups have examined the case for postcodes in Ireland and how they should be implemented, notably the Recommendation of the National Postcodes Project Board (NPPB) report – issued in July 2006 - on the implementation of postcodes in Ireland.

The Minister for Communications, Energy and Natural Resources officially announced in October 2009 the Government's intention to proceed with the implementation of a NPS. It was stated at that time that it would be based upon the NPPB report but that innovation with regards to the incorporation of the unique identification of properties should also be investigated. A Stakeholder Engagement Exercise in November 2010 found this approach would offer many additional benefits across a number of areas particularly in relation to non-unique addresses.

The legislative basis for introducing the NPS is set out in Part 3 of the Communications Regulation (Postal Services) Act 2011[1]

The detailed requirements for the NPS were developed as part of the tendering process to select a licence holder to run the requisite service. The 'competitive dialogue' procurement process afforded the Department of Communications, Energy and Natural Resources (DCENR) an opportunity to understand the issues involved in various approaches to the NPS through consultation with key stakeholders and with potential suppliers. The final tender document set out the objectives and set of requirements for the postcode which are summarised in section 1.4 below.

The successful Capita-led tender addressed all of these requirements but it was recognised that some further detailed design work would be needed on certain aspects to take account of practical implementation matters including the impact on postal operations. Subsequent consultation has taken place between the PMLH and An Post on certain topics within their domain as Universal Service Provider (USP) – principally in the approval of new postal addresses and their assignment within the national postal routing network.

[1] www.irishstatutebook.ie/2011/en/act/pub/0021/sec0066.html#sec66

1.3 Contents of this Document

Subsequent sections of this document set out (in the Section number references):

2. An overview of the rationale for the proposed Postcode design and the rules associated with its allocation
3. A description of the Postcode Validation approach
4. An overview of the PAD Design
5. A description of the PAD Validation approach, i.e. how the accuracy and completeness of the PAD will be assured before its release to the public and to public and private bodies
6. The proposed pricing model for the PAD
7. Conclusions: outlining the next steps in agreeing these designs and in moving on to implementation of the agreed designs.

These sections deal with the detailed design matters that were to be finalised post award of the tender to Capita. The Appendix contains detailed backup to the main report.

For information purposes, below we summarise the Design Principles agreed as part of the tendering process. Some of these required further detailed review – notably in relation to what was assigned a postcode – which is dealt with in subsequent sections.

1.4 Design Principles

The following were determined by DCENR as a result of its consultations with stakeholders and its analysis of tenderers' proposals:

1.4.1 Level of Granularity

A postcode should be assigned to each Unique Delivery Point - including multiple residences in the same building where the building has been specifically designed to contain multiple residences - In this instance, a single postcode refers to a single residence, as long as the residence is a single building or part of a purpose built building with multiple units (e.g. block of flats or apartment block).

1.4.2 Postcode format

The postcode should be a seven-character alpha-numeric code consisting of two parts:

- A three-character "Routing Key" identifying the postal distribution area – formerly referred to as 'post towns'.
- A four-character "Unique Identifier" (UI) that uniquely identifies each unique address point within a Routing Key.

This design achieved the optimal balance between size (which affects memorability) and allowing a sufficient range of postcodes for future needs (i.e. "future proofing").

1.4.3 Form of Address

The NPS must adopt the current postal address as designated by the USP and recorded as the postal address in the GeoDirectory as the basis for realising and maintaining the PAD.

1.4.4 Integration with Postal Operations

The postcode design must facilitate automated and manual sorting of post, the detail of which was to be refined in consultation with the USP.

1.4.5 Role of Dublin Districts

The NPS design should integrate the existing Postal District codes into the Routing Key.

1.4.6 Routing Key

For all other areas, the Routing Key should not refer to or be associated with the geographic place name or locality in the Irish or English languages.

1.4.7 Features to be Postcoded

The NPS must be optimised for the fulfilment of all requirements associated with postal addressing. This is not to say however that the postcode cannot potentially be used for additional purposes, but this must be a secondary consideration and approved in all instances by DCENR in advance to avoid potential reputational damage to the NPS. A number of detailed implementation aspects within the above Design Principles were discussed with the USP.

2 Postcode Design

Detailed design of the postcode involved consideration of a number of practical issues. Appendix A contains a detailed analysis of the issues, the pros or cons of the options considered and the rationale for the recommended design.

In this section, we describe:

- Why a unique postcode rather than an area based postcode
- What gets a postcode?
- What gets a unique postcode?
- The first three characters of the postcode
- The last four characters of the postcode
- Character set used
- Avoiding undesirable postcodes.

2.1 Why a unique postcode rather than an area-based postcode?

A major goal of the National Postcode System is to be able to identify each unique property in Ireland for the benefit of emergency service response, delivery optimisation, etc., having regard to the high proportion (35%) of non-unique addresses in the country.

Internationally, postcodes are generally assigned to a cluster of properties (i.e. they are an area-based postcode where multiple addresses share the same postcode). The average number of addresses in a cluster can range from ten to thousands. A small number of countries (e.g. UK, Netherlands) can get down to unique addresses by appending the house number to the postcode.

The area-based postcodes also tend to have an implicit structure within the postcode (e.g. first portion is town/county, second portion is a street). The key question is how well this type of postcode system would suit Irish circumstances.

There are a number of issues common to implementations of area-based postcode systems:

1. *Postcodes must change constantly to reflect new developments*

   Changes in the building densities or new developments may involve sub-dividing areas and assigning new postcodes to many of the residents. The maintenance requirements of ever changing area based postcodes are onerous. Changes to existing postcodes are slow to propagate throughout the systems that use them, have cost implications for industry and lead to data quality issues and potential service interruption for consumers.

2. *Are adopted by residents, estate agents, etc. as indicators of desirability*

   It is human nature to want to "belong" to the area you live in. Communities imbue postcodes - designed for postal sortation purposes - with affluence and status value; or conversely, postcode discrimination occurs where certain postcode areas become less desirable.

3. *Are used by insurance companies, school authorities, credit rating companies etc. to define policies*

   Because postcode areas exist, disparate users use the area aspect for grouping properties - solely designed for postal sortation efficiency - rather than aggregate addresses or determine administrative boundaries in a manner that is appropriate for their particular purpose. For example, rather than insurance companies determining premiums based on the exact location of the insured property, they assign a risk rating at a postcode level that may unfairly group 50 properties that are not the same risk together based on information pertinent to only five of the properties.

Issues 2 and 3 are a direct result of postcodes being used for purposes beyond their original design purpose (i.e. postal sortation and delivery). In the UK - more than fifty years after the introduction of postcodes - there are regular campaigns by residents seeking to have their postcodes changed for reasons of property value, insurance premiums, etc.

The prevalence of non-unique addresses in Ireland is also a major barrier to using an area-based postcode system. To be effective, it would be necessary to standardise addresses so that areas could be linked to clusters of addresses. In the UK, for instance, rural townland-style addresses were superseded by newly-created road names onto which house numbers were assigned. Such a programme in Ireland would likely face resistance and be a very onerous administrative undertaking. In short, it is not a practical proposition.

Technological advances offer an alternative approach where a code can be accurately assigned to each UDP using geo-coordinates. The GeoDirectory, developed jointly by An Post and Ordnance Survey Ireland, holds this data for all UDPs in the country and offers a readily-available, low-cost means of assigning unique postcodes to every address without the need to change addresses or indeed, any action of the part of citizens or organisations.

The recommended postcode design allocates a unique postcode to individually addressed UDPs, thereby resolving all of the issues highlighted above and as such, it is a unique solution globally. This type of code has further advantages:

- Those organisations interested in analysing groups of properties can do so more accurately using more discriminating boundaries rather than relying on the areas designed purely for postal sortation purposes.
- It is more closely linked to 21st century innovations such as GPS, mobile devices and location-based services rather than the 50-year old area-based postcodes.

2.2 What gets a postcode?

All addresses in permanent structures that receive mail will be assigned a postcode and will be included in the Postcode Address Database (PAD) - these are known as Unique Delivery Points (UDP). The source of this information is the comprehensive Central Address Database (CAD) used by the USP. This information is provided to PMLH via the GeoDirectory database which is a commercial database containing CAD addresses.

After the Postcode Launch Date, new postcodes will be assigned to any new UDP as notified by the GeoDirectory; any new properties or where a property has been re-configured. This will involve an interaction with the USP to ensure that the address is assigned to its correct Routing Key, a function reserved to the USP.

The following are some examples of what will and will not be allocated a postcode

What gets a Postcode	What does NOT get a Postcode
Each residential property, e.g. • Each house on a street • Each flat in an apartment block • Both units in a duplex unit • Halting site	**Other types of residence**, e.g. • Mobile homes • Canal barges or houseboats • Jeanie Johnson • Caravan
Non-residential addresses, e.g. • **Office building** • Factory • Units in a Shopping Centre • Units in a Business Park or Industrial Estate • College Campus	**Ancillary buildings/locations** e.g., • Milking parlour • Sports fields • Public parks • Points of interest (e.g. Dublin Spire)

2.3 What gets a unique postcode?

Every building with at least one UDP will receive at least one unique postcode. UDPs within buildings will receive their own unique postcode if unique address information has been captured by the USP for the UDP. In the case of residential addresses, this will usually be an "Apartment" number. In the case of commercial buildings, this will usually be a "Unit" number. Postcodes are not assigned to individuals or businesses, they are assigned to addresses.

However, commercial premises occupied by multiple tenants with no individual address indicators will only get one postcode which all tenants will use. Likewise, multiple occupancies in certain residential dwellings will only get one postcode if the sub building addresses are not identifiable (e.g. bedsits in a Georgian building). A UDP can be either a residential UDP or a non-residential UDP, it cannot be both. A building with both residential and non-residential addresses will receive unique postcodes for each of the identified uniquely addressed UDPs, with a minimum of two unique postcodes

The following are some examples of what will and will not be allocated a unique postcode

What gets a Unique Postcode	What does NOT get a Unique Postcode
Residential Address, e.g. • Each house on a street • Each flat in an apartment block • Both units in a duplex unit	**Residential Address, e.g.** • Residential building with multiple Flats/Bedsits that are not indicated as separate addresses on the outside of the building
Non-residential address, e.g. • Each single occupancy **Office building** • Each numbered unit in an Office building. • Each numbered Unit in a Shopping Centre • Each numbered Unit in a Business Park or Industrial Estate	**Non-residential address, e.g.** • Residential building with one or more registered business addresses where the property does not have a sign affixed to indicate a place of business • An office building with multiple businesses but without uniquely identified sub building addresses

When a building use changes from a single address to multiple addresses (e.g. Georgian building converted into apartments), the original postcode will be retired and new postcodes will be allocated to each of the new addresses. If an address with multiple postcodes reverts to a single address (reverse of previous scenario), the previous postcodes will be retired and a new postcode will be allocated to a building.

The situation is similar for non-residential buildings. However, where a single business occupies more than one unit of a shopping centre, industrial estate, etc., new postcodes will not be allocated; instead a primary postcode will be chosen and the other postcodes will become "linked" to this postcode. For example, if a business expanded from Unit 1 to Unit 1-3, the postcode assigned to the business would be the one previously used for Unit 1; the label would be changed to Unit 1-3 and the other addresses and their unused postcodes would be marked as linked, ready to be updated if the occupancy of the Units changed at a later date.

2.4 Routing Key (1st three characters of the postcode)

The first three characters of the postcode are called the "Routing Key". This is in the format of Letter-Number-Number with the single exception of the Dublin 6W postal district (D6W). The Routing Keys are defined by the USP's 139 principal post towns which reflect the sortation requirements of the mail distribution network.

The assignment of codes to these Routing Keys is designed to support the methodology for manual sorting of mail. Mail delivery will always comprise an element of manual processing of certain mail items which is time-consuming and expensive. Aligning this part of the postcode design with mail sortation requirements delivers benefits to the postal sector in terms of: timeliness and accuracy of delivery, reduced costs, and improved downstream access opportunities to the USP network by third parties, thereby increasing value and choice to the consumer.

While not linked directly to geographic features (i.e. towns, counties, etc.), it will provide a general sense of location in a similar fashion to telephone prefix codes , so providing a sense of geographic intuition aiding better recall.

2.4.1 First Letter of the Routing Key

Outside of Dublin, which uses the letter D, the characters A,C,E,F,H,K,N,P,R,T,V,W,X,Y are randomly distributed in a manner that facilitates manual sortation by USP. The character set chosen is explained in more detail in 2.6.

Note: this character set chosen for Routing Keys avoids confusion with the postcodes in use in Northern Ireland (i.e. BT2).

2.4.2 Numeric portion of the Routing Key

Outside of Dublin the numbers allocated to each Routing Key are assigned to facilitate manual sortation by USP and are guided by the following rules:

- All numbers are above 10 to avoid truncation (i.e. F01 written as F1)
- Avoid all numbers ending in zero (e.g. 20, 30, 40, etc.)
- Avoid all numbers that repeat (e.g. 22, 33, 44, etc.)
- Avoid using numbers that are reversals of other numbers (e.g. If 32 is used then avoid usage of 23)
- Avoid numbers with undesirable associations (i.e. 13, 69)
- Avoid Letter-Number allocations that could lead to undesirable words or terms, (e.g. K15 is the first three letters of KISS).

The full list and a map of Routing Keys are contained in Appendices C and D respectively.

2.5 Unique Identifier (Last four characters of the postcode)

There is an intuitive expectation that the last four characters of the postcode will have a structure or hierarchy associated with it. The public may also expect that postcodes will follow a "logical" sequence, e.g. if 1 Main Street is B2CD then 2 Main Street is B2CE etc.

There are a number of reasons why the recommended postcode design implements a random allocation rather than using a Hierarchy/Sequencing approach:

1. *Structure/Hierarchy affects future proofing of the postcode*

   Instead of being solely limited by the total number of address points required for each Routing Key, each sub-segment (e.g. representing a street) has a maximum

capacity. If the capacity is exceeded (e.g. new housing scheme built), postcodes will have to be re-assigned, or the inherent structure will erode over time.

2. *Hierarchy/Sequencing has in-built, time-delayed undesired consequences*

   As outlined in 1. above, a postcode design based on structure/hierarchy will lead to either existing postcodes needing to be changed or new addresses receiving postcodes that "break the rules" of the structure/hierarchy. This is also true of sequencing. The difficulty here lies in first agreeing what is a "logical" sequence, especially for rural addresses. Even if that is achieved new developments, especially infill, won't have their "logical" postcode as it is already allocated. This may have potentially serious consequences for new or changed addresses, if delivery/emergency services are making assumptions about location based on the structure of the postcode given.

3. *Hierarchy/Sequencing affects verification of postcode against address*

   Any hierarchy/sequencing implemented would lead to groupings of non-unique addresses having very similar postcodes. As the address cannot be used as a check, any errors of verbal miscommunication, transposition of characters, OCR errors etc. cannot be caught by reference to the accompanying address. The consequences for this range from a cold pizza delivery to sensitive financial information being sent to the wrong address to emergency services vehicles being sent to locations kilometres away from the real location. Our proposed solution guarantees that non-unique addresses that are the same will have very different postcodes, thus the address can be used to verify the correct postcode has been communicated.

4. *Structure/Hierarchy re-introduces the issues associated with area-based postcodes*

   If structure/hierarchy exists in the postcode itself, it will be used by insurance companies, school districts, etc. as a quick and convenient way to implement their policies and all of the issues we have identified with area based postcode systems would be re-introduced to our unique postcode design.

5. *Structure/Hierarchy is more difficult to implement and more expensive to maintain*

   The difficulty of agreeing a hierarchy that is acceptable to the public and the increased effort required to maintain the hierarchy cannot be underestimated.

The idea of postcodes having a structure/hierarchy can be traced to the natural, intuitive assumption based on familiarity with existing postcode systems which date back 50 years. These postcodes pre-date advances in technology, such as: hand-held track-and-trace delivery systems, GPS in-vehicle, sat-nav equipment and mobile devices. These advances call for "21st century" thinking being applied to how a postcode should be designed.

Furthermore, the USP has confirmed that structure/hierarchy within the last four characters of the postcode will not improve mail delivery and so, would not be desirable. The USP does

not require hierarchy/sequencing of the Unique Identifier for manual sortation purposes, and it is expected that VAR services will provide IT solutions to other organisations to assist any alternative manual sortation method that they may have.

For the above reasons, we recommend that the Unique Identifier is randomly allocated, subject to a number of rules to reduce the risk of confusion in its operation, as follows:

- Rural households with the same address (e.g. in the same townland or different townlands with the same name) should receive dissimilar postcodes to avoid OCR and verbal communication errors.
- Sequence the issuance of the combinations of characters such that those advantageous to avoiding OCR, verbal or memorability issues are prioritised.
- Spatial proximity should be taken into account when allocating postcodes to avoid any appearance of clustering of similar postcodes.
- Provide a set of reserved postcodes within each Routing Key for use by the USP or use by the USP/authorised postal service providers.

2.6 Character set used

The design objectives here are:

- To limit the risk of misinterpretation by automated sortation equipment using OCR which reads both machine-prepared and hand-written addresses on envelopes (e.g. the letter 'O' is easily confused with the number zero)
- To limit verbal miscommunication, as certain letters and numbers can sound quite similar when spoken, especially by phone.

We consulted with the USP on the former issue and conducted research internationally on both issues.

2.6.1 OCR considerations

Several letters can be confused with numbers (e.g., I-1, Z-2, B-8). There is a widely adopted convention that the conflicting alphabetic character is omitted and the number retained.

In addition, the uppercase version of a letter is used – and promoted as the standard - but consideration is also given to people writing the lowercase version of a letter.

Based upon our consultations, the following characters will be excluded from the postcode:

Excluded	B	G	I	J	L	O	Q	U	S	Z
Due to confusion with	8	6	1, J, L	1, I, L	1, I, J	Zero, Q	O, zero	V	5	2

This reduces the available character set to 26 (16 letters and 10 numbers)

2.6.2 Verbal miscommunication

There are three groupings of letters that are most commonly confused in verbal communication, as follows:

Set	Letters in this Set
The "E-Set"	B*, C, D, E, G*, P, T, V*, Z*
The "S-Set"	S*, F, X
The "M-Set"	M, N

** Already excluded*

Taking into account the characters already restricted for OCR reasons, if we were to limit our available characters by allowing only one character from each of the sets above, we would eliminate a further seven characters down to 19 available characters. This would seriously impact the range of postcodes that would be available.

For this reason, we have chosen to only remove "M" from our list of available characters. This will provide 390,625 possible unique postcodes for each Routing Key as compared with 130,321 that the reduced 19-character set would allow.

Thus our final list of 25 allowed characters is as follows:

- Numbers: 0 – 9
- Letters: A,C,D,E,F,H,K,N,P,R,T,V,W,X,Y

2.6.3 Postcode implications

We are applying the above principles to the postcode design to the two components of the postcode (i.e. Routing Key and Unique Identifier) as follows:

Component	Position	Allowed Characters
Routing Key	**1**	A,C,D,E,F,H,K,N,P,R,T,V,W,X,Y
	2	0-9
	3	0-9 with the exception of W for D6W
Unique Identifier	**4**	0-9 and A,C,D,E,F,H,K,N,P,R,T,V,W,X,Y
	5	
	6	
	7	

Memory recall works in chunks of memory, in groups of 3 or 4 characters or digits. A seven character postcode will be remembered as either two chunks of either 3+4 or 4+3. With this in mind, we will be taking control of the process and communicating the postcode as three characters followed by four characters. This will improve memorability.

2.7 Avoiding undesirable combinations

Because of the potential for a postcode to inadvertently spell an undesired word or term, we restrict certain postcodes from appearing. The potential for numbers in postcodes to look like letters is also taken into account when restricting postcodes.

The postcode creation routines will look for occurrences of undesirable letter sequences such as:

- Rude, offensive or otherwise inappropriate terms (Multi-language)
- English Words
- First Names
- Place names
- "Text Speak" or slang words
- Unique Identifier containing a Routing Key (e.g. D16)
- Names or acronyms for businesses or institutions as identified at the time of the initial creation of the NPS
- Miscellaneous terms identified by the PMLH (e.g. major brands).

3 Postcode Validation

Postcode validation will be handled as part of the PAD Validation (see section 5).

The primary objective is to validate that postcodes have been assigned accurately and comprehensively.

The validation criteria for postcodes are:

- All UDPs in GeoDirectory are allocated the correct postcode
- There is no duplication of postcodes
- Restricted postcodes do not appear.

Specific routines will be developed to validate these criteria independently of the team directly engaged in the production of postcodes.

4 PAD Design

The Postcode Address Database (PAD) is a file that cross-references postcodes to addresses. It will contain one record for each UDP derived from the GeoDirectory which in turn is in synchronisation with the USP's internal master list of postal addresses.

In most countries where postcodes exist, a PAD-type file is produced by the postcode operator to assist with: postcode validation, address verification and postcoding databases. Where additional data is appended (e.g. geo-coordinates), the PAD can assist in areas such as: marketing analyses, anti-fraud, logistics planning and other location-based services.

The PAD will be the PMLH's primary revenue source and will be distributed directly to end users. The PMLH will provide enhanced services through its Value-Added Resellers (VARs) who will be provided with additional data which will contain address "aliases" and (subject to contractual agreement with data suppliers) will contain geo-coordinates and boundary data which will be made available on a separate commercial basis to that of the PAD.

4.1 PAD content

The Postcode Address Database (PAD) will contain a listing of postal addresses in Ireland and their associated postcodes. There are approximately 2.2 million addresses, of which approximately 2 million are residential addresses and 200,000 are business/commercial addresses.

Every record in the PAD will contain the postal address assigned by the USP and where available, an Irish language version of the postal address. Each record will hold the postcode and a GeoDirectory Address Reference to allow linkage to GeoDirectory data if that is desirable. The GeoDirectory ID contained in the PAD is the 16 digit GeoDirectory ADDRESS_REFERENCE_ID which is a combination of the two 8 digit GeoDirectory BUILDING_ID and ADDRESS_POINT_ID identifiers.

In addition, each postal address in the PAD will be assigned a unique, permanent identifier ("PAD-ID") of ten digits. The PAD-ID is required to uniquely identify each postal address as multiple postal addresses can share the same postcode (e.g. a business premises with more than one business). This is important in tracking and reconciling changes in the way the GeoDirectory handles its references to addresses.

4.2 Address Elements

4.2.1 Parsing of Addresses

The PAD address elements have been created to accommodate all possible Irish residential and business postal addresses. In many countries, address formats have been standardised into a set format with a fixed number of address lines. That is not the common practice in Ireland, so there is a significant challenge in defining a representation of address elements that is consistent, easy to understand, and is capable of recording all known postal addresses in Ireland.

The USP defines an address for each address point which is based on its postal routing arrangements; however, it is not widely adopted (or enforced) as a standard and many private and commercial premises would use variants such as addresses based on geographic boundaries or on local traditional names or as supplied by their customers. The GeoDirectory contains the USP's designated postal address but does not record any variants used. This is more of an issue and a justification for recording such 'alias' addresses which the PMLH intends to provide later in the programme.

Our design for the PAD is based on research on the formats used in Ireland, and in other countries where similar considerations apply. The table below details the individual elements of the PAD.

Address element group	Address element of PAD	Max. field length
Unique Identifier	PAD_ID	10
Premises Elements	Department	60
	Organisation	60
	Sub Building Name (e.g. 'Flat 1')	60
	Building Name (e.g. 'Rose Cottage')	60
	Building Number (e.g. 22)	40
Thoroughfare Elements	Building Group (e.g. 'Marian Terrace')	60
	Primary Thoroughfare (e.g. 'Griffith Road')	40
	Secondary Thoroughfare (e.g. Navan Road')	40
Locality Elements	Primary Locality (e.g. 'Cookstown Industrial Estate')	40
	Secondary Locality (e.g. 'Manorhamilton')	40
	Tertiary Locality (e.g. 'New Ross')	40
	Post Town (e.g. 'Dublin 14')	40
	County (e.g. 'Cork')	30
Postcode Element	Postcode (e.g. 'A65 B2CD')	7
GeoDirectory ID	Address Reference to include both Building_ID & Address_Point_identifiers	16

Example Addresses (blank fields omitted):

URBAN ADDRESS	
PAD_ID	1234567890
Sub Building Name	APARTMENT 1
Building Number	3
Primary Thoroughfare	NEW ROW
Post Town	PORTLAOISE
County	CO. LAOIS
Postcode	A65 B2CD
Address Reference	1234567832345678

RURAL ADDRESS	
PAD_ID	2123456789
Primary Locality	GORTACLOONA
Secondary Locality	SCART
Post Town	BANTRY
County	CO. CORK
Postcode	A65 B2CD
Address Reference	2234567800000000

4.2.2 Handling of Irish Language

The PAD will be available in both English and Irish language versions. The population of addresses is identical in both languages; however the official Irish translation of address elements may not be available. In cases where the Irish translation is not available the address is populated with the English versions of the address.

4.2.2 File Format

The PAD will be distributed as a 'flat file', the most common and easy-to-use format that is available to users of all sizes. It will be sorted by Routing Key and then by address. The English and Irish versions of the PAD are always included in each distribution.

4.2.3 PAD Maintenance and Distribution

The PAD will be distributed through a web-based service that will be available to authorised users including members of the Public and small businesses (Pricing is contained in Section 6).

The PAD will be driven by the update cycle for GeoDirectory. This will be a largely automated process with a 'due diligence' process to ensure the integrity of the PAD. Where a building has been demolished, or reconstituted to contain multiple address points, existing postcodes will be retired. These will be retained in PAD database and marked accordingly.

5 PAD Validation

The design objectives for PAD Validation are:

- To ensure that every individual address is assigned its correct postcode
- To ensure completeness and accuracy of the PAD.

Quality Assurance and validation measures are designed into the methodology employed to arrive at PAD deliverable. This means that within each workstream there is a continuous process of reviewing results and ensuring changes made do not result in any degradation in system effectiveness.

In addition to the checks and balances made by workstream teams, the following independent validation measures will be taken in respect of the PAD.

5.1 Validation of GeoDirectory source data

As the GeoDirectory will be the basis for the PAD, it is essential that we quality assure its content, completeness, etc. The first step will be to verify that service levels claimed by GeoDirectory can be achieved i.e.

- 99% complete when compared with all postal addresses in the USP's (internal) postal address file; and
- 99.5% accurate when compared with all postal addresses in the USP postal address file.

The PMLH will agree a mechanism with GeoDirectory by which they can prove the achievement of the required levels of accuracy and completion.

Once the status of the GeoDirectory has been established, the PMLH team will move on verifying that the GeoDirectory has been accurately processed to create the PAD.

5.2 Validation of PAD versus GeoDirectory

The objective of this exercise is to test the completeness of the PAD.

The GeoDirectory database contains a table of all valid postal addresses with their corresponding postal address and unique address reference. PMLH will run routines to verify the following:

- All address references in GeoDirectory exist in the PAD database
- All postal addresses in the PAD match their corresponding address in GeoDirectory.

5.3 PAD Postcode Validation

The objective of this exercise is to test the accuracy of the postcode assignment process.

The procedure to validate that postcodes have been allocated correctly in PAD in a series of steps, as follows

- Verify that all PAD entries have been allocated a postcode
- Verify that allocated postcodes conform to the published postcode design format
- Verify that the Routing Key (First Three Characters) is correctly assigned to each postcode with reference to the corresponding identifier in GeoDirectory
- Verify that each residential address has received a unique postcode
- Verify that non-unique addresses have dissimilar postcodes to mitigate the risk of OCR or verbal miscommunication errors.
- Verify that business addresses in the PAD are assigned postcodes to the following criteria:
    - We will assign a unique postcode at building level if no unique address information is recorded per UDP (e.g. Unit number). All businesses within such buildings will share postcodes.
    - We will assign a unique postcode for each UDP with unique address information (e.g. Unit no) where the sub-building address element is recorded in GeoDirectory source data. All businesses within such buildings will be assigned the postcode associated with each uniquely addressed UDP.

The following diagram illustrates the relationship between the main data sources:

The final component of the Validation exercise will be to independently assure the completeness and accuracy of the PAD itself, particularly in regard to how postcodes are assigned and that the various rules (described in Section 2: Postcode Design) have been fully implemented.

These validation processes may raise queries or issues that may need review or correction in the GeoDirectory or the USP. The operational procedures associated with this and other aspects of the Validation exercise are under discussion with the USP and GeoDirectory.

This PAD validation programme will ensure delivery of a quality-approved PAD that meets the required levels of accuracy and completeness.

5.4 Feedback to GeoDirectory

The encoding phase of Public Sector Bodies address databases provides an opportunity to give feedback to GeoDirectory, relating to missing or inaccurate information contained in GeoDirectory. We plan to provide GeoDirectory with the following feedback:

- A list of buildings which we identify as having more address points than are currently contained in GeoDirectory.
- A list of townland/locality names that are not currently recorded in GeoDirectory
- A list of thoroughfares that are not currently recorded in GeoDirectory.
- A list of building numbers that are not currently recorded in GeoDirectory for identified thoroughfares.
- A list of buildings whose sub building identifiers are not currently recorded in GeoDirectory.

The PMLH will agree a format for provision of data to the GeoDirectory and agree turnaround times and reporting mechanisms for GeoDirectory to inform the PMLH of progress on identified issues.

PMLH Postcode Management Licence Holder

6 PAD Pricing

Redacted

Redacted

6.3.2 Proposed Model

The level of the pricing is based on the indicative pricing in the tender. The following table outlines the various uses of the data and details the associated fees.

Redacted

6.3.3 Pricing examples

Redacted

7 Conclusions

7.1 Achievement of Project Goals

This document defines the design requirements and principles that will be followed in the development of the requisite systems and processes needed to realise the NPS.

We believe that the proposed design will achieve the goals set for the project and accommodates the requirements of the USP (An Post). Specifically, the design will assign a postcode to each unique address point and capture this into the PAD. Validation programmes will provide assurance as to the accuracy and completeness of postcodes and the PAD.

7.2 Next Steps

Upon approval, work will proceed on refining the software systems for assigning postcodes and for creation of the PAD. Work of the validation processes will also proceed. There are two imminent project milestones which are critically dependent upon timely approval of the design, namely:

- Passing full PAD to the USP so that they can start on the nine-month project to postcode-enable their automated sortation systems
- Releasing postcode and PAD specifications to VARs so that they can proceed with developing and refining their products and services.

Both are targeted to be ready for June 2014.

Appendix

A. **Design assumptions & decisions**

B. **Stakeholder engagement**

C. **List of Routing Keys**

D. **Map showing Routing Keys**

Appendix A: Design Assumptions & Decisions

A.1 Purpose

The purpose of this section is to state the design requirements and assumptions that underpin the postcode design, detail the issues that were considered in the finalisation of the recommendation for a postcode design, the options available to address each issue, an evaluation of each option, a recommendation based on this evaluation, and items to be considered when implementing the recommended option.

A.2 Design Principles

Certain postcode design features were determined by the DCENR through consultations with stakeholders and its analysis of initial tender submissions as part of the competitive dialogue process. They are set out in Section 1.4 of this report and address the following:

- Level of Granularity
- Postcode format
- Form of Address
- Integration with Postal Operations
- Role of Dublin Districts
- Routing Key
- Features to be Postcoded

A number of detailed implementation aspects within the above Design Principles were discussed with the USP.

A.3 Issues Addressed and Recommendations

The following issues were considered when determining the postcode design:

1. Why a unique postcode
2. What is assigned a unique postcode
3. Avoid OCR (optical character recognition) errors
4. Minimise Verbal miscommunication
5. Postcode format should be consistent and memorable
6. Implied address in postcode
7. Code is 'Future Proofed'
8. Restricting undesired words or terms in postcodes
9. Hierarchy and sequencing in postcode format
10. Verbal postcode and address verification
11. Dublin 1-9 postcode format
12. Dublin 6W postcode format
13. County Dublin postcode format
14. Cork Postal Districts
15. Other Cities postcode format
16. Splitting of Principal Post Towns
17. Self-checking with the postcode

18. Effect of Change of property use on postcodes
19. Allocation of the principal post town designators

Note:

The term "post town" is used in places in this appendix as it is the term currently used within postal operations. This term is being replaced by the term "Routing Key" in referring to the first three characters of the new postcode.

1. Why a unique postcode?

International best practise involves implementing an area based postcode system where multiple addresses share the same postcode. An alternative is to implement postcodes that are unique to each building. A key concern is the suitability of the chosen postcode design considering that over 35% of addresses in Ireland are non-unique.

Options

There are two options available with regards to assigning of postcodes to addresses.

- Option A (Area based postcode) - In this instance postcode boundaries are created that group addresses together and give them a common postcode.

- Option B (Unique postcode) - In this instance a unique postcode is assigned to addresses.

Evaluation of Options

The following table presents a summary of the pros and cons associated with each of these options.

Option	Pros	Cons
A – Area Postcode	• Currently best international practice;	• Postcodes must change - The maintenance requirements of ever changing area based postcodes are onerous. Changes to existing postcodes are slow to propagate throughout systems that use them, have industry cost implications and lead to data quality issues and potential service interruption for consumers • Enables postcode discrimination - It is human nature to want to "belong" to the area you live in. Communities imbue postcodes designed for postal sortation purposes with affluence and status value. The flip side of this is postcode discrimination; • Enables scope creep - Because postcode areas exist, disparate users piggyback on grouping solely designed for postal sortation efficiency rather than aggregate addresses or determine administrative boundaries in a manner that is appropriate for their particular purpose

Option	Pros	Cons
		• Non Unique Addresses - In other jurisdictions an element of the address (usually a house number) with a postcode will uniquely identify a specific address that shares its postcode with a number of other addresses. In Ireland over 35% of addresses are non-unique and an area based postcode system would thus not be capable of identifying individual addresses in these instances. One of the major advantages sought from the introduction of postcodes, the identification of individual addresses which are non-unique, for the benefit of emergency service response, delivery optimisation, etc. is not realisable with an area based postcode system.

Option	Pros	Cons
B – Unique Postcode	• Maintenance – Easiest to maintain as postcodes do not need to change, and postcode boundaries do not need to be maintained. • Non Unique addresses – Solves the problem of identifying and locating the 35% of addresses that are non-unique by assigning a unique postcode to each address. • 21st Century Solution - An area based code that mimics the functionality of existing postcodes from the 60s and 70s would be viewed by many as out-dated. A unique postcode enables Ireland to take the opportunity of deploying a 21st Century solution	• Not currently best international practice.

Recommendation

Based on the appraisal of the options summarised above, the recommendation is Option B.

This recommendation is based upon the following:

- Solving the problems relating to 35% non-unique addresses in Ireland
- Implement a 21st century fit-for-purpose solution

Implementation Considerations

The following issues will need to be managed going forward as part of the implementation of the postcode:

- Correctly assigning postcode to each individual address
- Ensure postcodes are disseminated correctly to each non-unique address.

2. What is assigned a unique postcode?

Addresses that are within permanent structures that receive mail will be included in the Postcode Address Database (PAD), and will thus receive a postcode. The source of this information is the comprehensive Central Address Database (CAD) used by USP. This information is provided to PMLH via the GeoDirectory database, which is a commercial database containing CAD addresses.

The following table illustrates examples of what will and what will not receive a postcode based on the definition above:

What gets a Postcode	What does NOT get a Postcode
Each residential property, e.g. • Each house on a street • Each flat in an apartment block • Both units in a duplex unit • Halting site	**Other types of property**, e.g. • Mobile homes • Canal barges or houseboats • Jeanie Johnson • Caravan
Non-residential addresses, e.g. • Office building • Factory • Units in a Shopping Centre • Units in a Business Park or Industrial Estate • College Campus	**Ancillary buildings** e.g. • Milking parlour • Sports fields • Public parks • Points of interest (e.g. Dublin Spire)

A "letterbox" postcode does not provide a unique postcode for every apartment and business. If an apartment building has a single letterbox, or if multiple businesses in a building have a single letterbox will they share postcodes?

Options

There are three options available with regards to assigning of postcodes to multi-occupancy buildings.

- Option A (Individual postcodes for all records) - In this instance a postcode is assigned to all residential and business records in GeoDirectory. Every business name will have a unique postcode.

- Option B (Building only postcodes) - In this instance a postcode is assigned to all buildings in GeoDirectory.

- Option C (Individual postcodes for residential, building level for businesses) - In this instance a postcode is assigned to all uniquely identified residential addresses in multi-dwelling buildings, and assign a shared postcode at the building level for businesses in multi-occupancy buildings

- Option D (Individual postcodes for residential and business addresses) - Every building with at least one unique delivery point (UDP) will receive at least one unique postcode. UDPs within buildings will receive their own unique postcode if unique address information has been captured by the USP for the UDP. In the case of residential addresses, this will usually be an "Apartment" number, in the case of commercial buildings, this will usually be a "Unit" number. Postcodes are not assigned to individuals or businesses, they are assigned to addresses. A building with both residential and non-residential addresses will receive unique postcodes for each of the identified uniquely addressed UDPs.

Evaluation of Options

The following table presents a summary of the pros and cons associated with each of these options.

Option	Pros	Cons
A – Individual	• Consistent with expectations – Public expectation is for a unique postcode for every address including apartments and businesses;	• Maintenance – Difficult to maintain and manage changes to business addresses and the protocols involved in notifying postcodes.
B – Building Only	• Maintenance – Easiest to maintain. • Dissemination – Easiest to disseminate.	• Inconsistent with expectations – Public expectation is for a unique postcode for every address including apartments and businesses;

Option	Pros	Cons
C – Individual for Residential, Building Only for Businesses	• Maintenance – Removes the most difficult maintenance issue, notably changing businesses in multi-dwelling buildings; • Consistent with residential expectations – Public expectation is for a unique postcode for every address including apartments;	• Inconsistent with expectations – Public expectation is for a unique postcode for every business. Approximately 56% of businesses will still have a unique postcode as they are in single occupancy buildings; • Shopping Centre or Business Park Issues – Some 940 buildings have more than ten business addresses. These buildings contain 15,675 business addresses.
D – Individual for Residential, Business where Sub Building address information exists.	• Maintenance – Removes the most difficult maintenance issue, notably changing businesses in multi-dwelling buildings; • Consistent with residential expectations – Public expectation is for a unique postcode for every address including apartments; • Shopping Centre or Business Park Issues – Over 10,177 of the 15,675 business addresses in the 940 buildings with most business addresses contain a Sub Building Name element (e.g. Unit 1) that can be used to determine business address without reference to the business name.	• Inconsistent with expectations – Public expectation is for a unique postcode for every address including apartments and businesses, but this approach is more in line with "letterbox" expectations;

Recommendation

Based on the appraisal of the options summarised above, the recommendation is Option D.

This recommendation is based upon the following:

- The infrequent nature of residential building division/sub division
- The frequent nature of business address changes
- The data available in GeoDirectory on which to make decisions

- Public has been told that a unique postcode is on its way, not a building level postcode.

Implementation Considerations

The following issues will need to be managed going forward as part of the implementation of the postcode:

- Difficulty with tracking business address changes
- Issues with identifying shopping centres or business parks that may be recorded In GeoDirectory as a single building.

3. Avoid OCR errors

Optical character recognition (OCR) relates to the electronic conversion of scanned text into machine readable text. This is used extensively for the automated sorting of post and correspondence.

The postcode design needs to ensure that issues relating to OCR scanning errors are taken into account. Certain letters and numbers can be confused with each other e.g. 0 (zero) and O; 1, I (lowercase L) and ! (i). We have only considered issues relating to uppercase characters as all communication relating to postcodes will state that it should be written in uppercase only. In consultation with other stakeholders, notably An Post, the following characters have been identified as causing OCR errors

Character	OCR Error
B	Can be confused with an 8
G	Can be confused with a 6 (lower case g can be confused with a 9)
I	Can be confused with a 1, J, L
J	Can be confused with a 1, I, L
L	Can be confused with a 1, I, J
O	Can be confused with a zero or Q
Q	Can be confused with an O or zero
U	Can be confused with a V
Z	Can be confused with a 2
S	Can be confused with a 5

Options

There are two options available with regards to the restriction of letters that can cause OCR confusion:

- Option A (Restrict Everywhere) - In this instance all identified OCR error characters are restricted and cannot be used anywhere in the Postcode
- Option B (Restrict Where Confusion Can Exist) - In this instance the allowed characters are taken into account when defining where a character may be restricted. For example the letter B could be used as the 4th character in postcode if this is defined as a character that must be a letter and thus will not be confused with the number 8.

Evaluation of Options

The following table presents a summary of the pros and cons associated with each of these options.

Option	Pros	Cons
A – Restrict Everywhere	Simpler Definition – By defining a fixed set of 26 characters this makes it easier to implement OCR validation	Reduces available Postcodes - Restricts the maximum available number of postcodes for a post town.
B – Restrict where confusion can exist	Maximises available Postcodes - Maximises availability of postcodes per post town.	Complex Definition - By allowing certain characters in certain positions only it makes it more difficult to create OCR validation.

Recommendation

Based on the appraisal of the options summarised above, the recommendation is *Option A – Restrict Everywhere* is implemented.

This recommendation is based upon the following:

- The restriction still allows 456,976 postcodes per post town, ensuring future proofing of the postcode to allow expansion
- A simple definition will facilitate easier and more reliable OCR validation routines.

Implementation Considerations

The following issues will need to be managed as part of the implementation of the postcode:

- Consideration that other characters will also need to be restricted to reduce verbal miscommunication.
- Consideration that the maximum available postcodes for a post town will be reduced based on the removal of inappropriate words etc.

4. Minimise Verbal Miscommunication

The design needs to ensure that issues relating to verbal communication errors are taken into account. This is especially important for ECAS communication, which has specific procedures in place to minimise the impact based on NATO phonetic alphabet, but also for general verbal communication where this discipline will not be in place.

We have researched the area of spoken letter recognition issues and the research indicates the following three groupings of letters may be confused with each other:

Set	Verbal Miscommunication
The E-Set	B, C, D, E, G, P, T, V, Z
The S-Set	S, F, X
The M-Set	M,N

There is no definitive breakdown of the likelihood of confusion within Sets as the results are dependent on accent.

Taking into account the letters that we previously recommended should be excluded for OCR reasons we have the following table of additional letters to be excluded:

Set	Verbal Miscommunication
The E-Set	C, D, E, P, T, V
The S-Set	F, X
The M-Set	M,N

Options

There are three options available with regards to the restriction of letters that can cause verbal confusion:

- Option A (Restrict All Bar One in Each Set) - In this instance we will disallow all bar one of the letters in each set; e.g. Include C, X and N and exclude D,E,P,T,V,F,M;

- Option B (No Restrictions) - In this instance we do not disallow characters on the basis that they may cause verbal communication issues
- Option C (Limited Restrictions) – In this instance we have decided to limit the exclusion to a subset of characters that may cause verbal communication issues. Thus only M is restricted.

Evaluation of Options

The following table presents a summary of the pros and cons associated with each of these options.

Option	Pros	Cons
A – Restrict All Bar One in Each Set	• Minimises Verbal Miscommunication – By defining a single allowed letter for each Set we minimise verbal communication issues;	• Reduces available Postcodes - Restricts the maximum available number of postcodes for a post town. If we take the last four characters of the postcode and add in these exclusions we reduce the number of available postcodes from 456,976 to 130,321 assuming the previously identified OCR issue characters are removed.
B – No Restrictions	• Maximises available Postcodes - Maximises availability of postcodes per post town. 456,976 postcodes are available for each post town.	• M-Set Verbal Miscommunication Remains – The largest identified verbal miscommunication error remains.
C – Limited Restrictions	• Removes the largest Verbal Miscommunication Issue– By removing M from the list of available letters we resolve the largest identified miscommunication issue;	• Reduces available Postcodes - Restricts the maximum available number of postcodes for a post town. If we take the last four characters of the postcode and add in this exclusion we reduce the number of available postcodes from 456,976 to 390,625 assuming the previously identified OCR characters are removed.

Recommendation

Based on the appraisal of the options summarised above, the recommendation is that *Option C – Limited Restrictions for verbal miscommunication.*

This recommendation is based upon the following:

- The need to ensure the maximum future proofing of the postcode to allow expansion; and
- The desire to limit verbal miscommunication where possible.

Implementation Considerations

The following issues will need to be managed as part of the implementation of the postcode:

- The maximum available postcodes for a post town will be reduced based on the removal of inappropriate words etc.
- The allocation of postcodes per post town should seek to take into account verbal miscommunication, memorability, confusion with neighbouring properties, etc. To select from the list of available postcodes in a prioritized fashion.

5. Postcode Format Should be Consistent and Memorable

The postcode will be consistent, both in format and length to aid recognition and memorability.

The proposed design is a consistent seven character code comprised of two parts:

Part	Name
First Three	Routing Key
Last Four	Unique Identifier

The postcode format is A65 B2CD where:

- A is always a letter
- 6 is always a number
- 5 is always a number (with the exception W for D6W)
- B can be a letter or a number
- 2 can be a letter or a number
- C can be a letter or a number
- D can be a letter or a number

Options

There are two options available with regards to communication of the postcode format

- Option A (Single Seven Character Code) - In this instance we will communicate the postcode as a single seven character code without any space or separator

- Option B (Two Part Code with a space) - In this instance we will communicate the postcode as a two part code with a space. The code can be communicated as the first three characters are the Routing Key, and the last four characters are the Unique Identifier.

Evaluation of Options

The following table presents a summary of the pros and cons associated with each of these options.

Option	Pros	Cons
A – Single 7 character code	• Minimises OCR errors – Without a space there is less likelihood of misinterpreting the postcode; • Ensures consistency in databases – No need to be concerned whether the postcode is being stored as seven characters, or eight characters with a separator, and what type of separator is being used (space, dash, etc.)	• Difficult to enforce – While it is possible to advise organisations that they should print a postcode on mail as a single string of seven characters it will prove difficult to enforce. The public are liable, due to memory chunking, to split the postcode and write it as two parts.
B – Two part code with a space	• Improves Memorability - Memory recall works in chunks of memory, in groups of 3 or 4 characters/digits. A seven character postcode will be remembered as either two chunks of 3 and 4 or 4 and 3. With this in mind we will be taking control of the process and communicating the postcode as three characters followed by four characters, this will improve memorability. • Verbal Communication – A consistent chunking of (3 then 4) will reduce verbal miscommunications (listening errors) particularly in telephone-based usage.	• OCR Issues – Increases the likelihood of misinterpreting a postcode. This can be mitigated by ensuring that valid first three character combinations don't occur in the last four characters of the postcode. • Inconsistency of database storage – PMLH will communicate a consistent message that postcodes should be stored as a single string of seven characters and presented in forms, etc. as eight characters including the space. This will be difficult to enforce.

Recommendation

Based on the appraisal of the options summarised above, the recommendation is that *Option B – Two part code with a space* is communicated to the public.

This recommendation is based upon the following:

- The need to clearly communicate the postcode format; and
- The need to improve memorability; and

- The difficulty with enforcing a single seven character postcode presentation.

Implementation Considerations

The following issues will need to be managed as part of the implementation of the postcode:

- It should be communicated clearly in all messages to the public, businesses and public bodies that a space, and only a space, should appear in this position. There should be no hyphens, commas, etc... between the first three and the final four characters of the postcode.
- The need to communicate storage of postcodes in a consistent seven character format. The eight character communication is for presentation purposes only.
- Storage of postcodes in PAD as a seven character string.
- Presentation of postcodes on PMLH website, supporting documentation etc. should be two parts separated by a space

6. Implied Address In Postcode

If the first 3 characters are associated by the public with Counties, e.g. "I have a Roscommon postcode" then a problem will arise when the first 3 characters are perceived as being in the wrong county. This will lead to refusal to use the postcode or unofficial changing of the postcode by those affected;

If the first three characters of the postcode contain any implied address information (e.g. town) then adoption rates will be affected by those insisting they have been given the "wrong" postcode.

Options

There are two options available with regards to allocating the first letter of the postcode.

- Option A (Random Allocation) - In this instance we will use random allocation to assign the first letter to postcodes
- Option B (Rules based Allocation) - In this instance we will use a rules based approach to assign the first letter to postcodes.

Evaluation of Options

Option	Pros	Cons
A – Random Allocation	• Random – A random allocation has the benefit that a person hasn't decided a particular first letter for a postcode.	• Public Acceptance – A random allocation will inevitably lead to letters assigned that imply area names in some cases and thus cause confusion.
B – Rules based Allocation	• Public Acceptance – Ensures that the first three characters of a postcode are seen as a logistics identifier for mail rather than denoting an area.	• Implementation – More difficult to implement.

Recommendation

Based on the appraisal of the options summarised above, the recommendation is that Option B – Rules based Allocation is implemented. Thus the first three characters assigned to a postcode as the Routing Key will not indicate any town/county/area/etc.

This recommendation is based upon the following:

- The need to ensure public acceptance for the postcode project; and
- The desire to limit canvassing for special treatment of other Cities or Towns.

Implementation Considerations

The following issues will need to be managed as part of the implementation of the postcode:

- Ensure the first letter doesn't match the Post Town in English or Irish
- Ensure the first letter doesn't match the County in English or Irish
- Ensure the first letter doesn't match the County nickname, e.g. Rebels, Cats, Banner, etc.

7. Code is 'Future Proofed'

The postcode structure must cater for new addresses without the need to change assigned postcodes or the postcode structure. Fixed list of post towns and large capacity for growth in the final four characters is required.

The competing requirements are consistency versus future proofing of the postcode. The postcode format is A65 B2CD. If we want to impose a structure on the last four characters, - for example, Letter-Number-Letter-Letter - then we drastically reduce the number of available postcodes to an upward limit of 33,750. The largest post town, Limerick, currently requires more than 80,000 postcodes.

Options

There are three options available with regards to "future proofing" the postcode

- Option A (No consistency) - In this instance we will allow all available characters to be used in each position of the last four characters

- Option B (Consistency of format) - In this instance we will restrict available characters to be used in different positions of the last four characters of the postcode, e.g. Letter-Alphanumeric-Alphanumeric-Alphanumeric

- Option C (No Consistency combined with Prioritized Allocation) - In this instance we will allow all available characters to be used in each position of the last four characters as part of the design. As this gives us a maximum available list of 390,625 postcodes and the majority of post towns will require less than 50,000 postcodes (Limerick will require over 80,000) we can allocate postcodes prioritising consistency and memorability of the available postcodes. This approach essentially "ranks" the 390,625 postcodes in terms of desirability, and leaves the least desirable postcodes to be allocated last. For example we will prioritise all of the postcodes that have both letters and numbers and de-prioritise all postcodes that are all letters.

Evaluation of Options

The following table presents a summary of the pros and cons associated with each of these options.

Option	Pros	Cons
A – No Consistency	• Maximises Available Postcodes – Places an upper limit of 390,625 postcodes available per post town. The largest post town, Limerick, currently has over 80,000;	• Increases Inconsistency – A postcode is as likely to be D17 1234 or D17 ABCD.

Option	Pros	Cons
B – Consistency of format	• Improved Consistency – Easier to remember/recognise if there is a consistency to the format of the last four characters;	• Reduces available postcodes – The smallest reduction that would occur is if we constrain the format to Letter-Alphanumeric-Alphanumeric-Alphanumeric this reduces the available postcodes per post town to 234,375 which is a 40% reduction.
C – No Consistency combined with Prioritised Allocation	• Maximises Available Postcodes – Maintains the maximum allowable limit of 390,625 postcodes per post town; • Prioritised Allocation – Allocates postcodes in a prioritized manner to improve consistency and memorability for the allocated postcodes. Prioritised Allocation will provide the benefit of Option B (as these will be allocated first) with the capacity of Option A should the capacity ever be required.	• Potential Pattern Recognition –While the code will be communicated as being any combination of letters/numbers for the last four characters the pattern of allocated postcodes may become apparent and lead to implementation assumption errors for systems that accept postcodes if they don't follow the official specification.

Recommendation

Based on the appraisal of the options summarised above, the recommendation is that *Option C - No Consistency combined with Prioritized Allocation* is implemented.

This recommendation is based upon the following:

- The need to ensure the maximum future proofing of the postcode to allow expansion
- The desire to limit verbal miscommunication, where possible; and
- The desire to maximise memorability.

Implementation Considerations

The following issues will need to be managed as part of the implementation of the postcode:

- The maximum available postcodes for a post town will be reduced based on the removal of inappropriate character combinations etc.
- The allocation of postcodes per post town should seek to take into account verbal miscommunication, memorability, confusion with neighbouring properties, etc. to select from the list of available postcodes in a prioritized fashion.

8. Restricting undesired words or terms in postcodes

Combinations of characters and numbers in a postcode can inadvertently spell words. While the majority of words are innocuous, it is a very subjective assessment and for this reason it is best to exclude all words from the list of postcodes.

- "Text Speak" abbreviations should be restricted from appearing in postcode, e.g. R0FL.
- "Four Letter Words" and other offensive terms and racial epithets should not appear in a postcode. This should also apply to words in Irish.
- Names, e.g. J0HN, should not appear in postcodes.
- Place names (English and Irish) should not appear in postcodes. This also applies to major roads, e.g. M50.

Implementation Considerations

As part of the implementation of the postcode a review will need to be completed of all potential codes or valid character combinations to identify:

- All words
- Offensive terms
- Text Speak
- Place Names (English and Irish)
- First three characters of the Routing Key appearing in last four characters.
- Three letter acronyms (TLAs)
- Numbers with meaning (e.g. 999 or 911)

9. Should the last four characters of the postcode have a hierarchy or sequencing?

There is an intuitive expectation that the last four characters of the postcode will have a structure or hierarchy associated with it.

The requirement for structure/hierarchy of postcodes dates to the requirements in the 60s and 70s when they were introduced. Advances in technology, such as hand-held track and trace delivery systems and in-vehicle sat-nav equipment, render this requirement redundant. The USP have confirmed that structure/hierarchy within the last four characters of the postcode will not improve mail delivery (and may cause dis-improvement over time) and would not be used. The natural intuitive assumption that this is a requirement originates from familiarity with existing postcode systems.

Any hierarchy would require grouping the first and last two characters, e.g. the first two being a townland/street identifier and the last two being individual identifiers. The difficulty of agreeing a hierarchy that is acceptable to the public and the increased effort required to maintain the hierarchy cannot be underestimated. Existing hierarchies, e.g. using street names or Small Areas for the first two characters have been investigated and have capacity

issues that would not allow their use in a four character structure per post town. New addresses may not be capable of being accommodated within an existing hierarchy.

The public may expect that postcodes will follow a "logical" sequence, e.g. if 1 Main Street is B2CD then 2 Main Street is B2CE etc. The difficulty here lies in first agreeing what is a "logical" sequence, especially for rural addresses. Even if that is achieved new developments, especially infill, won't have their "logical" postcode as it is already allocated and these become second class postcodes;

Postcode discrimination (or snobbery) may exist for the first three characters of postcode, but as it covers tens of thousands of addresses it will hopefully be limited in effect. If the last four characters of a postcode contain area encoding information then this will exacerbate the situation leading to concerns about employment, insurance etc. discrimination based solely on the encoded area information.

Options

There are two options available with regards to having a hierarchy or sequencing of the last four characters of the postcode.

- Option A (Include Hierarchy/Sequencing) - In this instance we will use hierarchy and sequencing for postcodes allocation
- Option B (Exclude Hierarchy/Sequencing) - In this instance we will use pseudo-random allocation to assign postcodes.

Evaluation of Options

The following table presents a summary of the pros and cons associated with each of these options.

Option	Pros	Cons
A – Include Hierarchy/ Sequencing	• Public Acceptance – The idea of random allocation of postcodes can evoke a feeling of a haphazard, illogical process. In fact there is very little benefit in having a pattern that allows the public to roughly guess a postcode based on a neighbouring postcode;	• Verification of address – As the address can't be used as a check for non-unique addresses, any errors of verbal miscommunication, transposition of characters, OCR errors etc. cannot be caught by reference to the accompanying address. • Hierarchy Reduces available Postcodes - Restricts the maximum available number of postcodes for a post town. • Postcode Discrimination - The more identifiable area information that exists in a postcode the more

Option	Pros	Cons
		likely that informal postcode discrimination will take place. If insurance companies rate one postcode a higher risk than another based on postcode hierarchy it may lead to court cases against it. Such decisions will have to be on the basis of other boundary data sets rather than postcode hierarchy grouping • Overhead - The more complicated the allocation process in terms of hierarchy/sequencing the more costly it is to administer. • Expansion Issues – New addresses may not be capable of being inserted into existing postcode hierarchy/sequencing with the desired postcode. • Acceptance Issues – There will be difficulty gaining acceptance from the public for any grouping of addresses.
B – No Hierarchy/ Sequencing	• Verification of address – The address can be used as a check for non-unique addresses, to catch errors of verbal miscommunication, transposition of characters, OCR errors etc. • Maximises available Postcodes - Maximises availability of postcodes per post town. • Minimises Postcode Discrimination – The more identifiable area information that exists in a postcode the more likely that informal postcode discrimination will take place. If insurance companies rate one postcode a higher risk than another it will have to be on the basis of other boundary data sets rather than postcode hierarchy grouping.	• Communication – Requires clear communication to the public to explain that random allocation of postcodes doesn't lose any functionality. • For small business that use basic spread sheets for customer management – or for manual sorting the random nature of the postcode will bring no benefit without licensing the PAD or VAR services. However it is expected that VAR services will provide IT solutions to assist delivery companies etc. with any custom manual sortation requirements.

Option	Pros	Cons
	• Easier to Administer – Simpler allocation routines, and no concerns about expansion or acceptance of arbitrary grouping.	

Recommendation

Based on the appraisal of the options summarised above, the recommendation is for Option **B,** the last four characters of the postcode should contain No Hierarchy/Sequencing.

This recommendation is based upon the following:

- The need to ensure verification of postcodes for non-unique addresses
- The need to ensure the maximum future proofing of the postcode to allow expansion;
- The administration overhead.
- The desire to minimise the potential for postcode discrimination.

Implementation Considerations

The following implementation considerations must be made:

- Consideration that postcodes should be allocated in a pseudo-random rather than entirely random fashion to ensure non-unique addresses can be verified

10. Verbal Postcode Verification

As postcodes do not contain an extra character to act as a "check bit", it is expected that the receiver of a postcode will also ask for the address (or read back the associated address) in order to verify correct communication of the postcode with the sender. This needs to be taken into account when determining which postcodes are allocated to addresses. For example if an address in "Grange" is provided with B2CD and another in "Grange" is provided with B2DC this could cause an ambulance to be sent to the wrong location. Consideration is also required for multiple different "Granges" associated with the same post town.

Options

The two options available with regards to verbal postcode verification are:

- Option A (Ignore Verbal Verification) - In this instance we ignore verbal verification issues when allocating postcodes
- Option B (Rules based Allocation) - In this instance we will use a rules based approach to assign postcodes to address the issues of verbal verification of postcodes.

Evaluation of Options

Option	Pros	Cons
A – Ignore Verbal Verification	• Simpler – Easier to administer the allocation of postcodes.	• Verification Errors – A random allocation will inevitably lead to similar postcodes being assigned to properties that have the same address but may be some distance apart.
B – Rules based Allocation	• Validation – Assists the validation of postcodes with addresses.	• Implementation – More difficult to implement.

Recommendation

Based on the appraisal of the options summarised above, the recommendation is that *Option B – Rules based allocation* is implemented to ensure verbal postcode verification is taken into account in the allocation of postcodes

This recommendation is based upon the following:

- To assist verbal postcode address verification

Implementation Considerations

The following issues will need to be managed as part of the implementation of the postcode:

- Similar postcodes are not assigned to properties in the same townland
- Prioritise postcode allocation based on vowel miscommunication issues.
- Alias information will be required for rural addresses provided verbally that do not match the Postal Address.

11. Choose Dublin 1-9 post code format

A decision on how first three characters of existing Dublin Postal Districts are defined in a postcode. The choices are DN1 - DN9 or D01 to D09. Consistency of format and memorability are important concerns.

Options

There are two options available with regards to the first three characters of Dublin 1-9 postcode

- Option A (DN1 – DN9) - In this instance we will use DN as the first two characters for Postal Districts whose number is less than 10

- Option B (D01 – D09) - In this instance we will use D0 as the first two characters for Postal Districts whose number is less than 10.

Evaluation of Options

The following table presents a summary of the pros and cons associated with each of these options.

Option	Pros	Cons
A – DN1-DN9	• Removes zero or O confusion – Postcode will be pronounced as D-N-4;	• Inconsistent - All other post towns have letter-number-number format (with the exception of D6W). • Confusion – Public may be confused and carry the DN format through to create DN13 etc.
B – D01-D09	• Consistent – Letter-Number-Number format is consistent with all other post towns (except D6W).	• Causes zero or O confusion – Postcode will be pronounced as D-Oh-4 or D-Zero-4. As O is not a valid letter, this is easily interpreted as a zero;

Recommendation

Based on the options summarised above it is recommended that *Option B - D01-D09* be adopted.

This recommendation is based upon the following:

- The need to ensure consistency in the postcode design; and
- The desire to avoid confusion of how to write Dublin 11 – Dublin 24 post towns.

Implementation Considerations

In pursuing this option the following issues must be managed:

- Clear communication to the public regarding format of Dublin 1-9 postcodes and the inclusion of a zero between the first and last characters to ensure consistency of seven character postcode.

12. Choose Dublin 6W postcode format

The first three characters of the postcode assigned to Dublin 6W needs to be decided. If it is assigned D6W it will be the only code that doesn't conform to a Letter-Number-Number format. The decision needs to take into account public acceptance of any change given that all other Dublin Postal Districts will remain unchanged:

Options

There are three options available with regards to the format for Dublin 6W.

- Option A (D6W) - In this instance we will use D6W as the post town identifier for Dublin 6W.
- Option B (D06) - In this instance we will use D06 as the post town identifier for Dublin 6W.
- Option C (D26) - In this instance we will use D26 as the post town identifier for Dublin 6W.

Evaluation of Options

The following table presents a summary of the pros and cons associated with each of these options.

Option	Pros	Cons
A – D6W	• Public Acceptance – All other Dublin Postal districts are keeping their existing code, it would be difficult to justify making an exception for Dublin 6W; • An Post conformity – No requirement to change existing sortation.	• Inconsistent – Breaks the Letter-Number-Number format for all other post towns
B – D06	• Consistent – Conforms to Letter-Number-Number rule.	• Change for existing householders - Bundles Dublin 6W households into Dublin 6. • Is a change for An Post's existing sortation.
C – D26	• Consistent – Conforms to Letter-Number-Number rule; • Consistent with current An Post sortation.	• Change for existing householders - Re-opens the original issue that lead to the creation of Dublin 6W.

Recommendation

Based on the appraisal of the options summarised above, the recommendation is that *Option A - D6W* be used as the first three characters assigned to Dublin 6W.

This recommendation is based upon the following:

- The need to ensure consistency with the way all other households in Dublin 1-24 are treated to ensure acceptance; and
- The ease with which OCR and computer applications will handle this exception.

Implementation Considerations

The following issues will need to be managed as part of the implementation of the postcode for Dublin 6W:

- Clear communication to PAD users or VARs that the D6W exception exists.
- Consideration that allocation of postcodes for D6W to take into account verbal communication and memorability differences with all other Letter-Number-Number post towns.

13. Determine County Dublin postcode format

Householders living in County Dublin will be particularly sensitive to the postcode that will be assigned to them. The closer these areas are to current Dublin Postal Districts the more sensitive the issues (e.g. Blackrock, Howth, etc.). The chosen first letter, the issue of Odd/Even numbers, the implications of the magnitude of the number all have to be taken into account:

Options

There are two options available with regards to the format for County Dublin post towns.

- Option A (Treat on a par with Dublin 1-24) - In this instance we will use D as the first letter and choose odd numbers for Northside post towns and even numbers for Southside posttowns

- Option B (Treat equally with all other post towns) - In this instance we will use the same allocation methodology in keeping with all other post towns outside Dublin Postal Districts.

Evaluation of Options

The following table presents a summary of the pros and cons associated with each of these options.

Option	Pros	Cons
A – Treat on a par with Dublin 1-24	• May appear to be a logical extension of Dublin Postal Districts – By defining a single permissible letter for each set we minimise verbal communication issues;	• Slippery Slope – If it appears that households in Dublin are being treated differently it will cause reluctance to accept the "random" post town assignments for the rest of the Country, and especially other Cities who may lobby for their own first letter identifier.
B – Treat equally with all other post towns	• Equality of Treatment – Aside from the Dublin Postal Districts no coding system exists for postal sortation in Ireland. An Post relies on the address provided for postal sortation purposes. As all other post towns in Ireland will have a "random" letter-number,-number combination it is difficult to defend special treatment for Dublin post towns.	• Acceptance in Dublin – The treatment of Dublin Postal Districts may lead other householders to demand "D" postcodes. This myopic view should be countered by reference to equality with all other post towns outside of the Dublin Postal Districts.

Recommendation

Based on the appraisal of the options summarised above, the recommendation is that *Option B – Treat Equally with all other post towns* is implemented.

This recommendation is based upon the following:

- The need to ensure public acceptance for the postcode project; and
- The desire to limit canvassing for special treatment of other Cities or Towns.

Implementation Considerations

The following issues will need to be managed as part of the implementation of the postcodes for County Dublin addresses:

- Some parts of County Dublin are already in Dublin postal districts but are probably unaware of this fact. When these addresses are assigned a postcode, they will become aware of the fact that they have always been part of the Dublin postal districts.. The following areas have been identified:
  - The Ward, Dublin 11
  - Baily, Dublin 13
  - Howth, Dublin 13
  - Portmarnock, Dublin 13
  - Tibradden, Dublin 16

- Loughlinstown, Dublin 18
- Kilternan, Dublin 18
- Newcastle, Dublin 22
- Saggart, Dublin 24
- Rathcoole, Dublin 24

- There are parts of County Dublin that will be assigned a non-D postcode as they have not been issued a Dublin postal district code by An Post. The following areas have been identified:
  - Balbriggan
  - Ballyboughal
  - Ballybrack
  - Blackrock
  - Booterstown
  - Cabinteely
  - Dalkey
  - Donabate
  - Drumree
  - Dun Laoghaire
  - Garristown
  - Glasthule
  - Glenageary
  - Kilcloon
  - Killiney
  - Kinsealy
  - Loughlinstown
  - Lucan
  - Lusk
  - Malahide
  - Monkstown
  - Mount Merrion
  - Naul
  - Oldtown
  - Portrane
  - Rush
  - Sallynoggin
  - Sandycove
  - Skerries
  - Stillorgan
  - Swords

14. Cork Postal Districts

Dublin Postal Districts are in use and the public have a strong identification with them. While the four Cork postal districts numbers exist on some street name signs, they have not been assigned or used by An Post. We need to determine how much reaction there will be if these are ignored.

Options

There are two options available with regards to the format for Cork City post towns.

- Option A (Implement Cork 1-4) - In this instance we will assign the number 01 to 04 to the areas in Cork that correspond to the street signs
- Option B (Implement USP Principal Post Towns) - In this instance we will use the Principal Post Town treatment for Cork as provided by USP.

Evaluation of Options

The following table presents a summary of the pros and cons associated with each of these options.

Option	Pros	Cons
A – Implement Cork 1-4	• Avoids confusion with existing street signs	• Inconsistent – Treats Cork City differently from other Post Towns • Breaks link with Post Towns – All other Postal Logistic Identifiers are based on Principal Post Towns • Difficult to define – No clear history of how/why these were erected. New street names do not include the numbers.
B – Implement An Post Principal Post Towns	• Consistency – Treats Cork City the same as all other post towns outside the Dublin Postal Districts;	• Possible Confusion – Existing street signs have the numbers 1- 4 which may cause confusion to the public.

Recommendation

Based on the appraisal of the options summarised above, the recommendation is that *Option B – Implement An Post Principal Post Towns* is implemented.

This recommendation is based upon the following:

- The difficulty in defining Cork 1-4 areas; and
- Lack of use of these areas by the public; and
- The desire to limit canvassing for special treatment of other Cities or Towns.

Implementation Considerations

The following issues will need to be managed as part of the implementation of postcodes in Cork:

- Justification of D1-D24 when C1-4 are not being used.

15. Determine Other Cities postcode format

As existing Dublin Postal Districts are being preserved, there will be an expectation for other Cities that they will receive their own exclusive first letter. This could lead to lobbying for every post town to determine its particular first letter:

Options

There are two options available with regards to the format for Other Cities postcode format

Option A – Treat on a par with Dublin - In this instance we will use the first letter of the city in the postcode (e.g. G – Galway)

Option B (Treat equally with all other post towns) - In this instance we will use random first letter in keeping with all other post towns outside Dublin Postal Districts.

Evaluation of Options

The following table presents a summary of the pros and cons associated with each of these options.

Option	Pros	Cons
A – Treat on a par with Dublin	• Memorability – If the Letter chosen links with the City name this will increase memorability;	• OCR Issues – The letters G and L have been excluded for OCR reasons and are not available. • Irish Language – Waterford could be assigned W or P depending on whether English or Irish language was chosen.
B – Treat equally with all other post towns	• Removes OCR issues – Doesn't re-introduce letters that have been excluded for OCR error reasons; • Language Neutral – Removes the issue of W or P being used for Waterford.	• Acceptance – A myopic viewpoint from within each City may hinder acceptance of postcodes.

Recommendation

Based on the appraisal of the options summarised above, the recommendation is that **Option B** – *Treat Equally with all other post towns* is implemented.

This recommendation is based upon the following:

- The need to ensure OCR issues are not introduced.
- The desire to keep the postcode language neutral

Implementation Considerations

The following issues will need to be managed as part of the implementation of postcodes:

- Consistent communication that the first three characters of a postcode are a Routing Key, not a City/Town/Area code.

16. Consider the effect of creating new areas based on splitting of existing post towns

In order to ensure there is enough spare capacity for new postcodes it may be necessary to split existing post towns (e.g. Naas). It is important to consider possible negative responses by those who object to this new sub division and those who feel they should be in a neighbouring district. The largest current post town is Limerick with over 80,000 address points.

Options

There are two options available with regards to splitting post towns

- Option A (Split) - In this instance we will split Post Towns with over 50,000 address points

- Option B (Don't Split) - In this instance we will accept the Principal Post Town list submitted to DCENR by USP.

Evaluation of Options

The following table presents a summary of the pros and cons associated with each of these options.

Option	Pros	Cons
A – Split	• Allows Maximum Expansion – The less postcodes allocated to each PRC to begin with, the greater the expansion capability;	• Dilutes the Routing Key Message – We will be communicating the first three characters (Post Town) as the I Routing Key required by An Post as the USP. If the PMLH requires changes that are not Post Town requirements then this confuses the message.
B – Do not Split	• Consistent Message – The first three characters for the postcode can be communicated as the Routing Key assigned by An Post for postal routing/delivery reasons only.	• Reduces Available Postcodes – For Limerick there will be 80,000 plus postcodes allocated at Postcode Launch Date.

Recommendation

Based on the appraisal of the options summarised above, the recommendation is for **Option B**, that Post Towns are not split.

This recommendation is based upon the following:

- The need for consistency of communication of the first three characters of the postcode; and
- The expandability already built into the postcode for each post town.

Implementation Considerations

The following issues will need to be managed as part of the implementation of postcodes:

- Consistent communication of the basis for the first three characters of the postcode.

17. Self-checking with the postcode

Can the postcode be checked for validity (e.g. check digit)?

All postcodes with Postal addresses will be stored in the PAD database, which will allow checking that a postcode is valid and matches its address.

Options

There are two options available with regards to the format of the postcode

- Option A (Include Check Digit) - In this instance the postcode will increase to eight characters

- Option B (No Check Digit) - In this instance the postcode remains seven characters.

Evaluation of Options

The following table presents a summary of the pros and cons associated with each of these options.

Option	Pros	Cons
A – Include check digit	• Offline Verification – The check digit would allow verification that a postcode was invalid even if the user was offline (i.e. no access to the PAD). However the address would not be available as an additional check;	• Reduces memorability of the postcode - As the first three characters are the post town, the last five would either need to be communicated as a single large chunk or split up into two chunks.
B – No check digit	• Aids Memorability – Seven-character postcode that is communicated as two chunks of three and four characters aids memorability.	• Online Verification Only – Only connected devices, or devices with PAD data pre-loaded could look-up the postcode to validate it. As the address is an essential part of the validation process this isn't a concern.

Recommendation

Based on the appraisal of the options summarised above, the recommendation is for **Option B**, the postcode should be without a check digit.

This recommendation is based upon the following:

- Memorability of the postcode.

Implementation Considerations

The following issues will need to be managed as part of the implementation of postcodes:

- Communication to businesses and VARs that the address is a significant factor in verifying a supplied postcode.

18. How will changes of use of a property be catered for?

If a multi-unit replaces a single address or a property is demolished what happens to the existing postcodes?

Options

There are two options available with regards to changes to property use.

- Option A (Re-use postcodes) - In this instance we will re-use an existing postcode assigned to a single dwelling building as one of the multi-dwelling postcodes
- Option B (Retire and allocate new postcodes) - In this instance we will retire the existing postcodes and allocate new postcodes

Evaluation of Options

The following table presents a summary of the pros and cons associated with each of these options.

Option	Pros	Cons
A – Re-use	• Minimises Changes – Less postcodes will be "missing" from the current PAD;	• Confusion – The address has changed and the entity to which the original postcode applied is not the same entity as one of the new postcodes.
B – Retire	• Removes confusion – A new postcode signifies a new address. If there is a linkage between retired and existing postcodes this will enable analysis/updates by end users/VARs	• Reduces available postcodes per post town – This should not be an issue, the total number for last year was 3,686 additional sub buildings and 1,535 sub building removals.

Recommendation

Based on the appraisal of the options summarised above, the recommendation is for **Option B**; that changes to the use of a property should be dealt with by retiring existing postcodes.

This recommendation is based upon the following:

- The need to provide clarity that a postcode always refers to the same address
- The fact that business changes have no effect as their postcode is at building level.

Implementation Considerations

The following issues will need to be managed as part of the implementation of postcodes

- Consideration for how GeoDirectory currently account for changes in the use of a property or addresses.

19. Allocation of the principal post town designators

The first three characters of the postcode are determined by the principal post town associated with the postcode. We evaluate the options available when allocating these characters.

Options

We assessed two options with regards to allocating the first three characters.

- Option A (Random) - In this instance we allocate the first three characters randomly according to certain rules. While allocating in this fashion we prioritise the following rules
  - Postcode should not start with the same first letter as its post town in English.
  - Postcode should not start with the same first letters as its post town in Irish.
  - Postcode should not start with the same first letter as its County in English.
  - Postcode should not start with the same first letter as a recognisable nickname/area name (e.g. Rebel County for Cork)

- Option B (Non Random) - In this instance we allocate the first three characters in a non-random manner to enable USP manual sortation.

  Manual sortation of mail by the principal post town is performed by placing the correct items into the correct slots on a sortation frame. The sortation order is well established and follows a certain sequence. If the principal post town designators of the postcode do not follow the same logical grouping and sequencing already in use by USP then it will not be used. We will thus have a post code that isn't used by USP to maximise efficiency. If the principal post town designators follow the same logical grouping and sequencing already in use by USP then it allows USP to reduce training requirements for additional staff hired for the Christmas period.

To explain this let us consider a simplified fictional view of manual sortation requirements for USP personnel for their sortation frames when the post towns are aligned with, and then not aligned with USP mail sortation requirements.

1. **Aligned**

1 A10 – A50	**2** A60 – A80	**3** A92
4 C10 – C20	**5** C30 – C80	**6** D01
7 D02	**8** D03	**9** D04

2. **Not aligned**

1 A10, C15, T22, F41	**2** A12, H15, F42	**3** A14
4 A28, C18, T24,F15	**5** C23, H25, F45	**6** D01
7 D02	**8** D03	**9** D04

In creating the design for this option the requirements of the USP have been modified to remove certain idiosyncratic characteristics specific to USP use that might be non-intuitive and difficult to explain to the public.

The method of manual sortation is delivery driven; therefore it also has the advantage of embedding non-random intuition into the post town element of the postcode.

If we take the following examples

- Letters are nearly always clustered together, e.g. All "V" are in the south west
- T12, T23 and T34 are beside each other in Cork City.

The letters used are A,C,D,E,F,H,K,N,P,R,T,V,W,X,Y. This is the same set of letters allowed for the last four characters of the unique identifier.

Evaluation of Options

The following table presents a summary of the pros and cons associated with each of these options.

Option	Pros	Cons
A – Random	• Removes all area issues – As geographical intuition is absent, there is less concern about public reaction to being given a postcode perceived to be for a different county;	• Non Intuitive – Public will have an expectation that they can infer logic from the first part of the postcode. • Does not assist manual sortation of mail, and therefore will not be used by USP.
B – Non Random	• Assists manual sortation of mail, and therefore will be used by USP. • Intuitive – The code has some intuitive logic rather than simply random.	• Area Issues – More explicitly introduces "area" definitions and raises the prospects of public reaction to their specific grouping.

Recommendation

Based on the appraisal of the options summarised above, the recommendation is for **Option B**, that the principal post town designators should be allocated in a non-random manner.

This recommendation is based upon the following:

- The need to assist manual sortation by USP
- Public expectation that there will be some intuitive logic to postcodes.

Implementation Considerations

The following issues will need to be managed as part of the implementation of postcodes

- It is important to note that whatever post town naming option is chosen we are not trying to imply county definition or any other area information as post towns do not align with these administrative boundaries. It is not possible for a new development to know what post town they will be associated with until after USP has added the new addresses to their route network. For this reason clearly defined boundaries can provide misleading information and lead to objections.

Appendix B: Stakeholder Engagement

The following tables list the views of the stakeholders with whom we consulted in the design phase of the project.

B.1: An Post

Postcode Design

Issue	Stakeholder's View
Avoid OCR errors	The An Post position, informed by our OCR suppliers, regarding the optimal use of characters from an OCR viewpoint is presented below: Character position where only a letter may appear: A,B,C,D,E,F,H,K,M,N,P,R,S,T,V,W,X,Y,Z Character position where only a number may appear: 1,2,3,4,5,6,7,8,9,0 Character position where either a number or letter may appear: A,C,D,E,F,H,K,M,N,P,R,T,V,W,X,Y,1,2,3,4,5,6,7,8,9,0 An Post agrees with the PMLH suggestion that the Postcode should not begin with the letter "B" to avoid OCR conflict with Northern Ireland postcodes. An Post requires that upper case letters only appear in the official postcode format for alphabetic characters used in the postcode. An Post's very strong view is that the postcode should be future-proofed from the outset and this extends to the postcode configuration. This is a critical issue for An Post.
Consistency & Memorability	The postcode format and length should be consistent, i.e. all seven characters should be used in every postcode. There should be no gap between the first three characters of the postcode and the last four characters of the postcode. This is a critical issue for An Post.

Issue	Stakeholder's View
Postcode is future-proofed	An Post will not want to expand the code. An Post's preference is for the code to be future proofed at the start with no built-in cliffs, i.e. elements of the code that are constrained. Once the post-town list is established it cannot change. An Post has identified principal post-towns in the list provided to the PMLH and the DCENR. If there is a need to split post-towns at this stage An Post will engage to see where that is feasible. This is a critical issue for An Post.
Dublin 1-9 postcode format	An Post prefers D01 to D09 rather than DN1 to DN9. This is a critical issue for An Post.
Dublin 6W postcode format	For Dublin 6 West the code should be D6W. This is a critical issue for An Post.
County Dublin postcode format	All parts of County Dublin are assigned to post-towns; however, not all parts of County Dublin use a Dublin postal district number. For illustration, take the example of Howth. Howth is in the post-town/postal district of Dublin 13. The current standard address format for Howth is: Howth County Dublin Therefore, its address will be: Howth County Dublin D13 XXXX However other areas, for example Blackrock, Co. Dublin, are not in existing Dublin postal districts and will receive a post town identifier that does not begin with D. This is a critical issue for An Post.
Cork Postal Districts	An Post does not operate postal districts in Cork. The treatment of Cork City required by An Post is as shown in the principal post-town list provided to the PMLH and the DCENR. This is a critical issue for An Post.
Other cities' postcode format	This is a post-town based postcode. Other cities' postcode format does not arise. This is a critical issue for An Post.

Issue	Stakeholder's View
Sequencing & Hierarchy with the postcode	An Post strongly advise to stay away from sequencing or any form of hierarchy; it is not required for postal purposes. AP believes that less hierarchy avoids emotive issues.
Implied address within the postcode	An Post offered the following advice: the proposed code is a post-town based code, not a county based code and do not build in any language dimension.
Splitting of Post Towns	An Post has based its post-towns on principles of logistics. If the PMLH wishes to split a post-town at this stage An Post will be happy to engage to see where that is feasible. If the PMLH wants An Post to look at splitting a post-town it will look at it but the split must be based on logistical principles to avoid detrimental effects on An Post's quality of service and cost base. An Post recommends that the splitting of principal post-towns be avoided as there are easier ways of ensuring maximum future-proofing. This is a critical issue for An Post.

Other Matters

Issue	Stakeholder's View
Postcodes for non-postal features	An Post advised that it is important that someone can find the postcode wherever they are and the PAD needs to be kept "Pure" (i.e. does not contain non-postal codes). An Post advised to be careful that if external parties (e.g. utilities) can start allocating codes that PMLH will lose control. The main problem arises where the code starts to appear in public - if a code is assigned then people will start to send post to it.

Issue	Stakeholder's View
Position of the postcode	Positioning the postcode at the end of the textual address for domestic mail and on the penultimate line for international mail is the recommendation of the 2006 National Postcode Project Board and is the international standard promoted by the Universal Postal Union (UPU), the United Nations body that sets international postal standards. It is important for OCR readability that the non-postcode address elements remain unchanged. It is An Posts strong preference that post-towns and the Dublin Districts continue to be used as part of the standard address when postcodes are introduced, e.g. Oak Road Dublin 12 D12 XXXX. This is a critical issue for An Post.
Reserved postcodes	Postcodes per DSU can be reserved for the USP/authorised postal service providers and used for special sorts, e.g. Government campaigns, etc. This is a critical issue for An Post.
When postcodes can appear on post	It will take nine months to update An Post's OCR equipment and there can be no mail appearing with postcodes during that period or the An Post quality of service and costs could be adversely affected. For this reason there should be no communication of postcodes or parts of postcodes prior to the An Post OCR equipment being ready to handle postcodes on mail items. If postcodes are publically communicated or begin to appear on mail prior to the completion of the An Post OCR upgrade An Post will take action to protect its quality of service and cost base. This is a critical issue for An Post.

B2: Public Service Bodies

A workshop was held with a range of public service bodies to present the proposed design for the postcode and the PAD. No objections were raised with the proposed designs. The bodies represented were:

- Department of Agriculture, Food & Marine
- Central Statistics Office
- Department of Education and Skills
- Department of Environment & Local Government
- Health Service Executive
- Local Government Management Agency
- Revenue Commissioners
- Department of Social Protection
- Department of Transport, Tourism and Sport.

B3: Emergency Services

A similar workshop with representatives of the emergency services who also had no objections to the proposed postcode and PAD designs. Representatives of the following services took part:

- Emergency Call Answering Service (ECAS)
- Irish Coast Guard Service
- Garda
- Fire Service
- Ambulance.

B4: Irish Language Bodies

We also consulted with Foras na Gaeilge and Conradh na Gaeilge on the question of using alphabet letters not traditionally used in the Irish alphabet (i.e. J,K,Q,V,W,X,Y,Z). There were no objections to their use as part of a coding structure and it was noted that they are already in use in Irish (see http://breis.focloir.ie/en/fgb/).

B5: Cork City Council

The USP has previously stated that it did not assign nor does it use the existing district numbers that appear on some street signs in Cork City.

Cork City Council's Executive Engineer with responsibility for Roads and Transport has confirmed that there is no historical documentation available detailing the rationale behind these district numbers appearing on signs. The district numbers are not used to determine the delivery of services.

Consequently, there is no case for incorporating the district codes used in parts of Cork City.

Appendix C: List of Routing Keys

PMLH Postcode Management Licence Holder

Appendix D: Map of Routing Keys